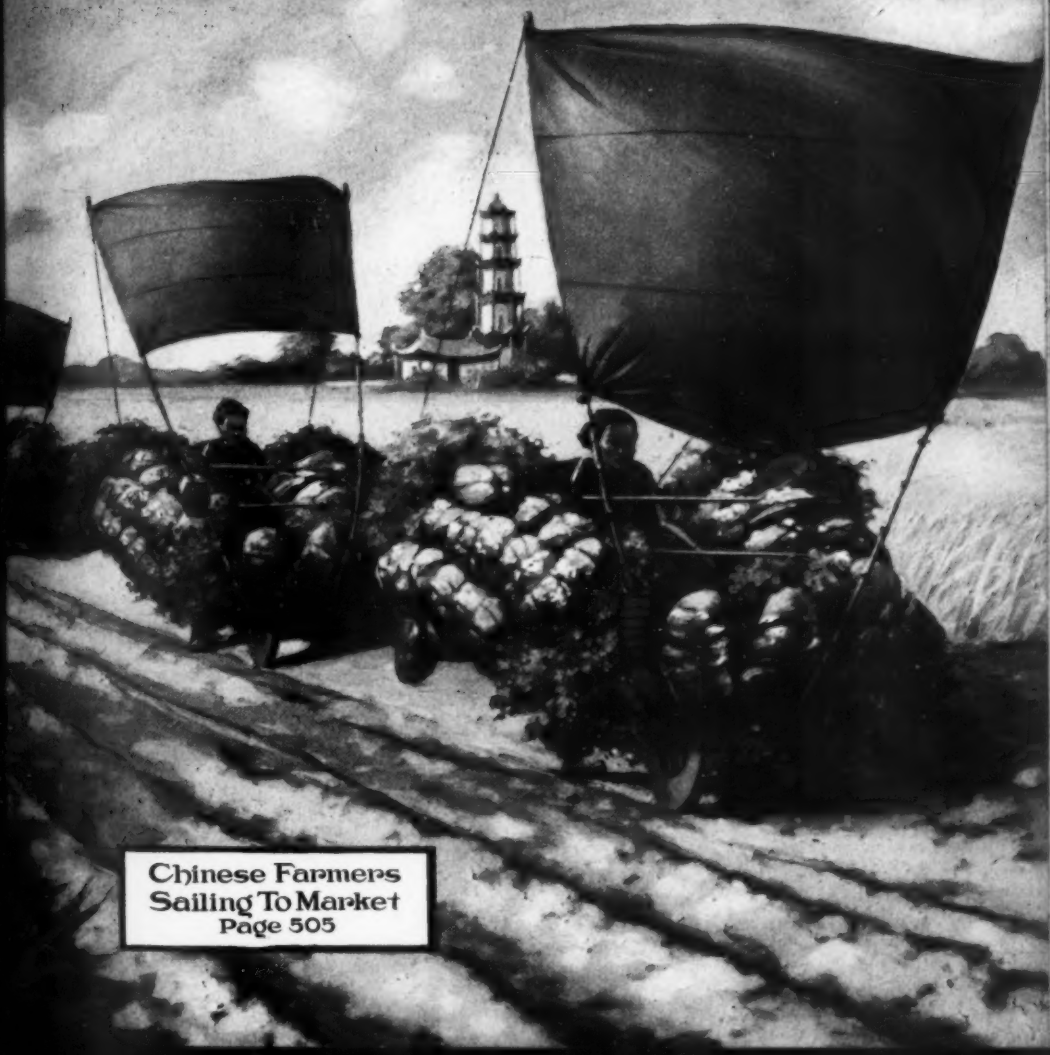
October This Issue 370,000 15 Cents

POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND IT



Chinese Farmers Sailing To Market
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These Building Material Prices Limited To 60 Days

Design No. 73
Eight Rooms and bath all rooms convenient and roomy. Size 28x24 feet.

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Design No. 93
Seven Rooms and bath, very attractive exterior; sleeping porch, balcony Size 30x22 feet.

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Here is an opportunity for any man to own a home of his own, no matter how limited his means. Even if you have not definitely settled on any building plans for the summer, it will pay you big to take advantage of this sensational offer. Order material NOW—build later. We are determined that the summer of 1913 shall be the biggest, busiest season in the history of this company. Hence these unprecedented offerings, the like of which have never before been made in the history of building material business.

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Nowhere else, in all the world, can you duplicate these prices. We will save you from ½ to ⅔ what you would have to pay elsewhere. Look well at the illustrations of the 4 homes here shown—note the brief descriptions. We will furnish you the material needed to construct any of these homes strictly according to our Plans, Specifications and Material list at the prices quoted for each. But that is not all. We will deliver all of this material right to your railroad shipping point, FREIGHT PREPAID BY US—no charges to be paid by you at all. You are not even required to pay one cent down. We ship subject to examination wholly at our own risk. We positively guarantee every item we send you to be high grade, clean, brand new stock. We would not dare ship from $500 to $1,000 worth of material on these liberal, no-money-down, freight prepaid terms, were it otherwise.

Special Notice: These freight prepaid prices for all points in Ill., Ind., Ohio, Southern part of Mich. and Wis. and Eastern part of Ia. and hold good for these 4 designs only. Special freight prepaid prices to any point outside of above territory.

These Prices Good Only For 60 Days

Please remember, the prices quoted in this advertisement hold good only for 60 days. After that they will positively be withdrawn. If you are wise you will not let this chance go by as it may never come again. So be sure to write us today.

50c Buys Complete Set of Blue Print Plans

This is the first time we have ever offered a complete set of plans for only 50c. Plans offered at this price are only for the designs shown in this advertisement. This is a part of the building material offer and like it, is good only for 60 days. Usually, when you go to an architect, plans like these would cost you about $50. If you buy the bill of material from us we will absorb the 50c charge and the plans will cost you nothing.

Plumbing Material

Write for price on our complete bath room outfits. We guarantee a saving of 30% to 50%.

$736

Heating Plants

Steam, Hot Water, and Warm Air. Let us Estimate on your requirements. Big saving.

$10,000 Book of Plans Free

The houses here shown are four of our regular designs taken from our Wonderful Book of Plans, containing 100 pages of beautiful, modern homes. Let us send you a copy of this magnificent book FREE. Not only do we save you from 25% to 50% on your complete building, but we give you all the assistance you need for its proper and economical construction free of charge.

$762

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We guarantee all brand new stock, sufficient quantity, prompt shipment. $10,000,000 capital backs Guarantee.

Design No. 57.
Six Rooms and Bath. Note the handsome exterior appearance of this design—the well arranged front porch and manner in which gable ends are finished. Sloping front and rear and the dormers give a most pleasing roof effect. Large living room with cased openings to reception hall and dining room. All bed rooms have square ceilings—no cut-off corners. Plenty of closet room. Size 24 ft x 26 ft.

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Prominently known to the public for 20 years as the great "Price Wreckers," and now owned by the Harris Brothers Company, have decided that their best interests require that the name of the principal owners of the company be more prominently brought to the public's notice. There is no change in our business, except that the four Harris Brothers will, in the future advertise and sell their goods, heretofore advertised and sold under the name of THE CHICAGO HOUSEWRECKING COMPANY, under the name of the Harris Brothers Company.

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Five Rooms and Bath. Large living room; private porches. Designed to be built without waste, either in material or labor. Splendidly arranged interior. Exterior, with its gables, exposed rafters, wide projecting eaves that keep out wind and weather and ample porch room, has all the charm of a modern California bungalow. Size 37 ft. x 29 ft.

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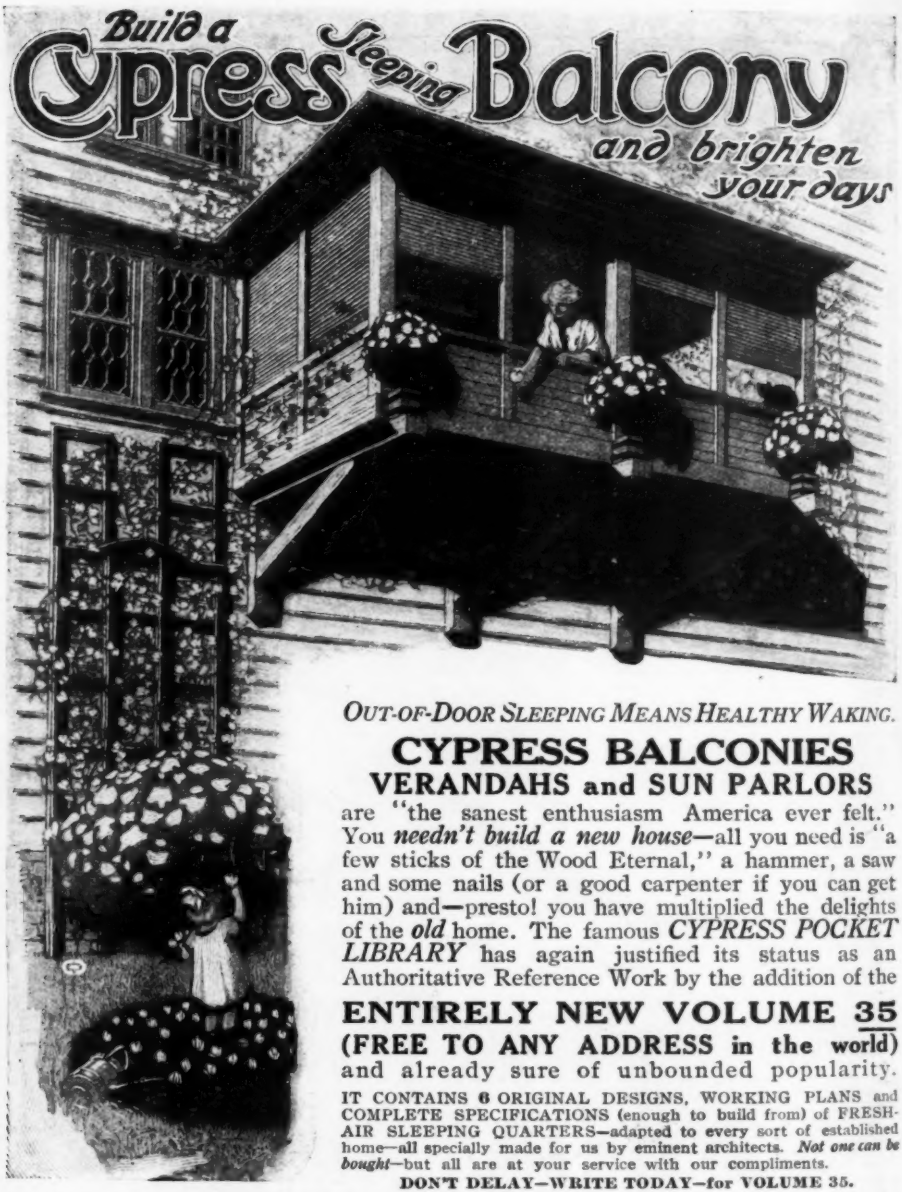

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CROSBY-CHICAGO

Popular Mechanics Magazine

318 W. Washington Street, Chicago, U. S. A.

EDITED BY H. H. WINDSOR

ISSUED MONTHLY — SUBSCRIPTION: — SINGLE COPY, 15 CENTS

In United States, and its possessions, Cuba and Mexico, per year, postpaid - - - - - $1.50
To Canada - - - - - - - - - - - - - - - - - 1.75
To all other countries in the Postal Union - - - - - - - - - - - - 2.00

All subscriptions are discontinued at expiration. Please examine the date printed on your wrapper.

Entered as Second Class Matter Sept. 15, 1903, at the Postoffice at Chicago, Illinois, under Act of March 3rd, 1879.

Published monthly by POPULAR MECHANICS CO. Copyrighted 1913, by H. H. WINDSOR.

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Efficiency's First Aid —Good Light

"You're working in the dark!" said a Western plant manager to his friend who had asked him to visit the latter's publishing offices in an Eastern Ohio town.

"How do you make that out?" asked the publishing man with a little astonishment. "We've had electricity here for five years."

"That may be," said the Western man. "And I don't mean that you can't see your hand before your face. But you haven't really emerged from the dark age. Honest, have you changed your lighting arrangements in those five years?"

The publishing man admitted that he hadn't.

"I thought so," said his frank visitor. "They were pretty poor to begin with, and they're entirely out of date. They're out of date because we're living in an age of really good light. More than half of your floor space is gloomy, partly because you use old-fashioned lamps—the Edison Mazda gives three times as much light with the same amount of electricity that is used in these ordinary carbon lamps—and partly because they are not placed to advantage. You're handicapping yourself and your entire force. You're putting a check on your office efficiency, which is bad business and you're wasting money on old methods which is bad business again. Good light is a big factor—it's efficiency's first aid. It would be worth all it costs even if it cost a lot of money. And yet it's cheaper than ever it was—been going down in price while the cost of everything else has been going up."

The result of this plain talk was that the publishing man got into communication with the local lighting company next day, and found himself keenly interested in the plans laid out by the electrical engineer who called to see him. Seven months later when he saw his friend again he declared: "You put it bluntly about my lighting, but you saved me money. My system now costs me no more, and you wouldn't know the place as it is now. It has put snap into all our work—I think we turn out fully thirty per cent. more than we did, and we do it with fully fifty per cent. more comfort. I'm a light enthusiast from now on."

This incident reflects an experience in a certain type of business, but there is no sort of business to which the outspoken philosophy that stirred this particular manager might not apply with equal force. For manufacturer and merchant, banker, broker or business man anywhere, good light is a basic business factor.

Good light is good business. It brings people into a store, for example, and helps sell goods to those people. It helps the display of goods, and it affects not only customers but the selling force.

It affects equally the brain output and the physical output of every sort of business. It raises the percentage of sheer efficiency in every unit of a force, whether it is a small office force of a dozen or a large force of a thousand. That percentage of increase in efficiency would be considered highly important in a group of machines. It is even more so in a group of men or women.

Perhaps you have realized this fact in your business without guessing exactly how the thing might be worked out to meet your special needs and opportunities. It is possible that you have not ascertained the cheapness and facility of modern wiring—that you may not know of the growing cheapness of electric light itself.

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WAS A CLERK (BERT TIPPEY)

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On Trial —You are allowed a trial examination of the Course—If it isn't perfectly satisfactory you can return it within two days and get your money back. The Course is all sent to you at one time.

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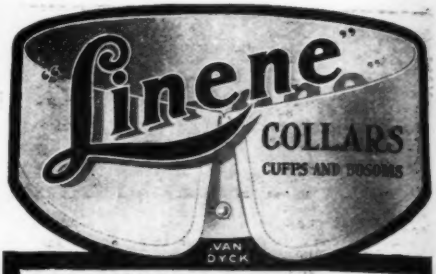
NOTE — Beware of Imitators — Deal with the Originator



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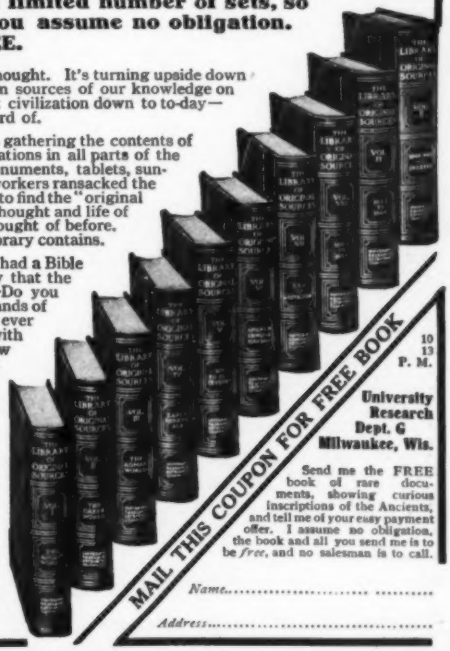

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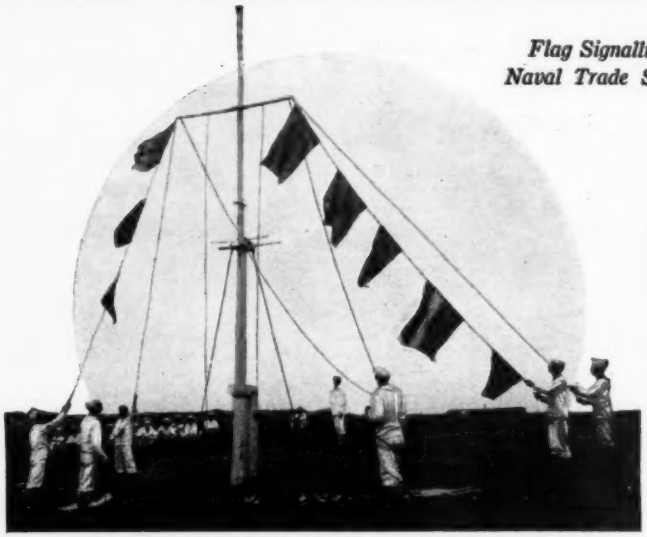

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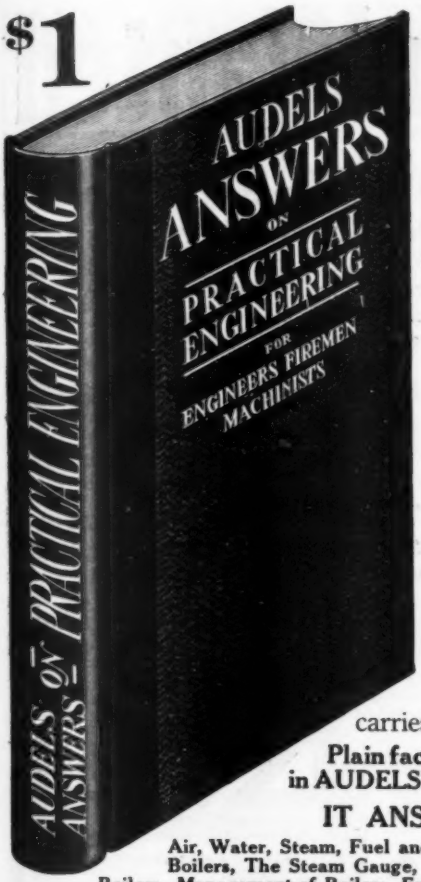

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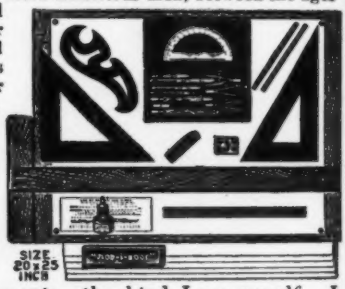

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BUY direct from wholesaler, C. O. D. on approval. 2¼ carat, blue-white, perfect solitaire diamond ring, $195, worth $300. Solid gold watch $15, worth $30. Guaranteed 10-day offer. Beck Jewelry Co., 110 Equitable Bldg., Baltimore, Md.

TIME and Its Measurement—An unusual book, being a readable and instructive history of time measurement from the sun dial of remote ages down to the clock period and the present day. Of interest to everyone connected with horology and contains much information not available elsewhere. Written by a great authority who has made this study a hobby. Price in cloth binding $1.50 postpaid. Popular Mechanics Book Dept., Chicago.

OLD GOLD

$1 MAILED you for each full set of false teeth sent us. Partial sets in proportion. Highest prices for Old Gold, Platinum, Silver, Diamonds and Jewelry. Send by Parcel Post today. Ask for list of wonderful Diamond bargains. Phila. Smelt. & Ref. Co., 825W Chestnut St., Phila., Pa. Est. 21 yrs. Keep ad for reference.

FOR ADVERTISERS

BARGAIN Advertising Rate—Just to get acquainted. 15 words, one insertion; guaranteed 18,000 copies printed, and one year's subscription, 25c. Digest, Grand Rapids, Mich.

ADVERTISERS—Here's your opportunity. 25 word classified ad inserted in "Cartoons Magazine" for 50c, one inch display ad, $1. 23,000 copies. Send in your ad for the next issue. Cartoons Classified Dept., 320 W. Washington St., Chicago.

YOUR 30-word ad in our 32-page postcard magazine, 20c. Display, 50c inch. Elite Exchange, 3827 Kenneth Ave., Chicago.

YOUR 25-word advertisement in 100 monthly magazines, three months $1. Bennett Co., 453 East 186th St., N. Y.

SALES letters that get business my specialty. Will H. Myres, Norwood, Ohio.

I WANT to send you proof of the wonderful pulling power of Popular Mechanics classified pages. What's your proposition? Write me today. F. W. Johnson, Classified Dept., Popular Mechanics Magazine, 218 W. Washington St., Chicago.

CEMENT

IF you want the best information on cement and concrete construction, subscribe for Concrete-Cement Age, leading cement and concrete monthly. Sample copy, 10 cents. Yearly subscription, $1.50. Concrete-Cement Age, 135 Newberry Bldg., Detroit, Mich.

COLLECTIONS

"SKILLFUL Collecting" tells how you can turn bad accounts into cash. By a sure, easy system. Send today and receive a free copy by return mail. Collectors' Ass'n, 36 Long Street, Newark, Ohio.

COLLECTIONS — Any kind, anywhere; commission basis. Great Eastern Mercantile Agency, New Bedford, Mass.

CLAIMS; all kinds, collected anywhere. Fidelity Credit Co., Richmond, Va.

TO MANUFACTURERS

WANTED—Agency for grocery, ironmonging and other profitable propositions. Write us. F. W. Rose, Rosemont, Greenacre Rd., Bankstown, Australia.

WANTED—High-grade article, Missouri and Southeast. Specialty Sales Agency, Wright Building, St. Louis, Mo.

BUSINESS OPPORTUNITIES

OPERATE an "Income Mail Business" the Booster Way! Booster Magazine—the one one bona fide publication in the world devoted exclusively to the interests of agents and all interested in the Mail Order Business. More people read "Booster" than any other trade paper—this alone should convince you that today is the day to learn all about "Booster"—its money-coining suggestions and principles. Join our ranks now—let "Booster" put you next to the best money-making propositions—ones that really get you the money! Ten cents will bring two copies worth dollars to you. If you don't like it, we'll send your dime back. Booster Magazine, Northwestern Building, Chicago.

COIN money making Name-Plates and Glass Signs. We'll teach you the business thoroly—we know how. 5 years' experience and practice making thousands of signs taught us—we can teach you in less than 30 days. Attracto Sign Co., 2657 North Clark, Chicago.

MAIL Order Dealers—Add a profitable side line to your mail order business. $5 starts you. No stock to carry—repeat orders, printed matter furnished—profits one-half—particulars free. The Merford Co., Dept. P, Chicago.

YOU can print imitation typewritten letters for about eight cents per thousand! Complete instructions, source of supply, also how you can make money selling these instructions, 10c. If dissatisfied, we'll send your dime back. P. Rodolph, Northwestern Building, Chicago.

ANY man or woman who wants to go into a good paying business that can be run at home in spare time, should write Merford Co., Dept. A-1, Chicago.

WE start you in business, furnishing everything; men and women, $30 to $200 weekly, operating our New System Specialty Candy Factories, home or small room anywhere; no canvassing. Opportunity lifetime; booklet free. W. Ragsdale Co., East Orange, N. J.

JOIN our Mail-Order Club! Membership fee $1. Entitles you to regular $5 course, also to buy goods wholesale prices. Send stamp for particulars. Dept. B, Central Supply Co., Kansas City, Mo.

CASH for names, information, formulas, ideas, etc. Steady home business. Instructive booklet for 2 amp. Information System, 305, Marietta, Ohio.

YOUNG man to operate penny slot machines; my free booklet tells how you can easily make $50 to $100 weekly; something entirely new. Chandler, 328-L, Cranston St., Providence, R. I.

START a mail-order business and make good money; our valuable book tells you how. Worth dollars. Yours for 10c. P. S. Bureau, 3311 Belleplaine Ave., Chicago.

"HOW to make good in the mail order business." Read our magazine. 10c copy. Three months 25c. The "Lever" Mail Trader, 44 Elizabeth, N. J.

USE your spare time to build up a mail order business of your own. We help you start for a share in profits. 27 opportunities. Particulars free. Mutual Opportunities Exchange, Buffalo, N. Y.

EARN $7 to $12 daily, restoring faded colors in rugs and carpets. Whole or spare time. Armenian process. Great demand. No capital. Particulars free. Eldred, Dept. 75, Detroit, Mich.

INCREASE your income. "Successful Brains" shows ten ways of making big money with little or no investment. Descriptive circular free. Thomas, Box 175, Ann Arbor, Mich.

NEW Money Maker. Costs 10 cents, sells for two dollars. Circular free. The Chemist, 2342 Thomas Ave. North, Minneapolis, Minn.

GET the Mail Order Guide! Only 25c—but it will start you successfully in business. Free particulars. Mail Order Guide, Dept. 200, Yonkers, N. Y.

MAIL-Order Books, the kind that sell. 200 per cent profit. Samples 25c. Imprint circulars furnished. B. Newnham, Waukegan, Ill.

GINSENG $35,000 acre. Information on request. Enclose stamp. G. Hartz, Canal Fulton, O.

500 PRACTICAL ways to make money, 50c. Hardy's, Oakland, Cal.

DON'T miss advertisement "Get The Latest," miscellaneous column.

WANTED—State agency, good proposition. Huntress & Co., Bisbee, Ariz.

FOR Sale—Patent and small stock of Comfort Feed Bags, positively the best invention for feeding horses while hitched. Would sell the whole patent for $2,000 or accept a royalty from good parties able and willing to push the sale. The only reason for selling is that I am otherwise profitably employed. If interested, send for copy of the patent. John Quincy Adams, Westmont, N. J.

YOU can make big money handling our proposition—something unique—an article that can be sold in nearly every house. The business can be worked either along mail order or agency lines with unusual profit. Send 10c for sample and wholesale prices, or write for free instructive literature, "How You Can Become Your Own Boss and Establish a Big Income;" tells how and gives plans of operation. Northern Supply Co., 154 Randolph, Chicago.

If you have $216 I can show you how to get started in a business which will show you a gross profit of 233 1/3%. Only reliable men and women wanted. Must act as our local sales manager. Most wonderful money-making business. W. F. Mitchell, Suite 630, 1011 Chestnut St., Phila.

MR. Mail-Order Man: Get quick returns. Established corporation supplies fast mail-order sellers; factory prices. Classy proposition. Beginners or established firms. Copyrighted Prospectus free. Mississippi Valley Co., Inc., Box M629, Pittsburg, Kans.

WANTED—Men and women to open cleaning, dyeing and pressing shops in every neighborhood; no capital or experience necessary. Pyra Chemical Co., Box 336, La Crosse, Wis.

"THE Art and Process of Dry Cleaning." A fascinating and profitable occupation. 25c postpaid. Auburn Supply Co., Dept. D C, 7745 Peoria St., Chicago.

ONLY hotel in Ohio town, 2,500 population, clears over $4,000 year net profit; will check over past years and prove earnings; or will exchange for farm. Write for invoice and particulars. Frank Wilson, Kenton, O.

CANDY—"How to make pure candy and start a profitable business." A splendid and complete course, postpaid, 50c. Auburn Supply Co., Dept. C Y, 7745 Peoria St., Chicago.

LEARN to collect money by a sure, easy system. Big income. Quick results. No capital required. Send today for instructive free book, "Skillful Collecting." Collectors' Ass'n, Long Street, Newark, Ohio.

SEND for booklet, "How You Can Become Your Own Master Without Capital;" no competition. Daugherty, 1236 Madison Street, Chicago.

YOUR 25-word advertisement in 100 monthly mail-order magazines, three months $1. Bennett Co., 455 East 180th St., New York.

PLEASANT spare-time work, mailing circulars. Good pay; no scheme. Details free. Home Pub. Society, 1217 Market St., Philadelphia, Pa.

INVENTORS—I will advance money to secure patents on new and useful inventions. Write to J. B. Miller, 593 Loan and Trust Building, Washington, D. C.

$300,000—IN Sales—"Something Different" Mail Dealers' Propositions. Samples, 10c. Particulars free. P. Rudolf, Northwestern Building, Chicago.

RESILVER mirrors and make plenty of money. Full instructions, 25c. Auburn Supply Co., Dept. RM, 7745 Peoria St., Chicago.

GOOD RESULTS—Greatest mail order magazine published. Three issues, 10c. Publishers, 2311PM, N. 43rd Ave., Chicago.

AGENTS, mail-order dealers, mechanics, inventors—Send stamp for important information in your line. Howestoll, 102 Sumpt Street, Brooklyn, N. Y.

ARE you sick of your job? Years of drudgery on small pay. Long weary days. Dreary night work. It saps a man's energy. Grinds him down. Kills ambition. Day in and day out. Same old nerve-racking detail. Your bond-clipping boss gets the benefit of this kind of life. Wake up now. Don't wait until ambition is all gone. Our big money-making propositions will lead you to fortune and prosperity. No capital, experience or canvassing required. Five Great Dollar Coining Opportunities worth $5 free for stamp. Don't put this off a single minute. Send now. It should mean comfort and luxury for you. F. C. Wilson, 11 West 108th St., New York.

INTELLIGENT representative in each town. Profit-sharing proposition. Capital unnecessary. Smith, Box 379, New Bedford, Mass.

STOP making other people rich. Start a mail order business of your own and earn $50 to $250 a week. I made $50,000 the first five years with a small mail order business, $10,000 the first year. Began with $5. No matter where you live I will show you how to start small in your own home, in spare time, evenings, at first. Experience unnecessary. No canvassing. Send today for my illustrated free booklet. It tells how I can help you. Heacock, A 5074, Lockport, N. Y.

MANUFACTURE a stove polish that polishes nickel and blackens stove in one operation. Formula $5. Guaranteed as represented or money refunded. This polish clears me $50 weekly here. F. Finkbeiner, 416 Seymour St., Syracuse, N. Y.

YOUR 25-word ad inserted in "Cartoons Magazine," 2 50c. One inch display, $1. Circulation, 23,000 copies. Send copy now. Cartoons Classified Dept., 322 W. Washington St., Chicago.

FOR Sale—Machine shop with contract drilling, 40,000 pieces yearly at 10c each. Particulars and sample by parcel post for 75c. Henry Frick, Fricks, Pa.

ADVERTISE—20 words in 100 monthlies $1; 100 weeklies $2; 20 Sunday papers 5; all three lists $7. Life Co., St. Louis.

LEARN Realty Business. Big income. Free booklet tells how. American Realty League, San Francisco.

I CAN show a man with $2.75 cash the biggest Wall Paper Cleaning Proposition ever offered; good for $18 weekly, operate in spare time. Full particulars and sample of cleaner 10c. Milliken Co., Davenport, Iowa.

MAKE money in land sales, no large capital needed. Opportunity never was greater, right in your own locality, without experience. Send 50c to-day for complete instructions to start at once. Cevely-Keiser Sales Co., Holton, Kans.

TIME now to get best legitimate game to make money at County Fairs or Parks. Cleared $120 July 4th. Better than "Nigger-drop" or Weighing Scales. Send $2 money order for set and instructions. W. Lang, Ironwood, Mich.

SEND 50c for my complete instructions "How to get into the land business without putting up a dollar to buy land." Auburn Supply Co., Box 282, Dept. J, Auburn, Me.

PATENTABLE Ideas Wanted—Send for 3 free books. R. B. Owen, 30 Owen Bldg., Wash., D. C.

ANYONE anywhere, $5 daily replating silverware. Samples free. E. Fiske, 101 Sheffield Ave., Buffalo, N. Y.

MAIL-ORDER Dealers: Send for our catalogue for brand new articles to sell. Gordon Mfg. Co., Northwestern Bldg., Chicago.

MAKE Big Money Opening Safes and Setting Combinations. Write Wayne Strong, 811 Temple, Los Angeles, Calif.

$3,000 YEARLY in your back yard. This new industry now making fortunes. I'll help you—as I have helped thousands of others—to an easier living. 20 years of honorable dealing. Your back yard—a city lot—under my instructions, can make you a life income. My unique "schemes in dirt" have aroused workers everywhere. Burdick's "Post Bulletin" starts you and editor boosts. This current number, 10 cents. Benjamin Burdick, Kalamazoo, Mich.

MAKE money making mirrors at home—20c silvers a glass selling $2 to $5. Full, explicit directions how to do it for only $1. Start in this big-paying business. Send $1 to-day. Patterson & Co., Dept. 5, Brooksville, Ky.

BEST imported and domestic novelties, tricks, jokers, puzzles, etc., at lowest wholesale prices. Complete assortment, prompt shipments. Catalogue free. Joseph Methieu, 293 Court St., Brockton, Mass.

BE Independent. Star money-making mail order business at home. New plans. Everything furnished. Only small capital required. Free booklet and particulars tell how. W. P. Miller Co., Box 254, Muskegon, Mich.

AN intelligent person may earn $100 monthly corresponding for newspapers. No canvassing. Send for particulars. Press Syndicate, 706 Lockport, N. Y.

RAISE Ginseng, $1 per ft. of ground; ½ acre, $25,000. Write Ginseng Gardens, Sheboygan, Wis.

CASH for your business or property. I bring buyers and sellers together. Write me if you want to buy, sell or exchange any kind of business or property. Established 1881. Frank P. Cleveland, 1308 Adams Express Building, Chicago, Ill.

MAKE and Sell Mission Furniture—From our instructions one man who was an amateur made and sold $400 worth of just one article alone. We give you 98 designs and easily followed directions for making each piece in 3 books at 50 cents each or $1.50 per set, postpaid. Popular Mechanics Book Dept., 318 W. Washington St., Chicago.

ASK Bode about Buying! Selling! Advertising! Anything! Get acquainted "Now"! Bode, 288p Main, Hart ford, Conn.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order business. I furnish Formulas, Manufacturing Processes and Trade Secrets in all lines. Sold under positive guarantee; 18 years' practical experience. Revision and improvement of Formulas and Processes—reduction of manufacturing cost—utilization of waste materials, etc., a specialty. Booklet, Formula List, and Valuable Information Free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

FOR Sale—An old, well-established Southern school for girls; good opportunity for young man; will sell entire plant at reasonable price, has been good money-maker and has bright prospects for future with right man in control. Party has good reasons for selling. Want to list with some good real estate agency. Address Lock Box 15, Bowling Green, Va.

WE Sell Patents. Established 1900. If you wish to add a new product to your line, write us. Charles A. Scott Co., 506 Central Bldg., Rochester, N. Y.

OPERATE Hahn's Premium Machines, the best seller for cigars and candies. J. Hahn, 1016 Germantown Ave., Philadelphia, Pa.

WE help raise capital at once to start you in retail, manufacturing, patent, real estate, mail-order, or any legitimate business, by means of "our practical method." Particulars free. The Business Aid Co., K 504, Detroit, Michigan.

WOULD you like to own a good-paying mail order business? We have a line that gets repeat orders all the time. You can start in spare time; invest a dollar or two a week and soon own a nice business of your own; write for particulars. Nadico, 1664 Belmont Ave., Chicago.

LET the Parcels Post Help You. Add ($15 to $25 weekly) to your present salary or income. Start during spare time and build up a permanent mail-order business of your own. We show you how and help you make good. No canvassing. Experience unnecessary. The Parcels Post makes success doubly sure. Our new ideas and up-to-date plans bring the money. No so-called "Course of Instruction" to sell. We give that free. Write today. Address Pease Mfg. Co., Inc., Dept A, 70 Broadway, Buffalo, N. Y.

INCORPORATE your business under Arizona laws. Cost small. No franchise tax. Stockholders exempt from corporate debts. Do business anywhere. Laws and forms free. Southwestern Securities & Investment Company, Box D488, Phoenix, Arizona.

BIG Profits for You! Manufacture Barley Crisp. New confection. 5c package costs you 1c. Machine, instructions complete $7.50 prepaid. Send 10c for samples. Barley Crisp Co., 1605 Hyde St., San Francisco.

TRIAL Offer: $1 places your 25 word ad in 200 different magazines. Send copy now. King's Magazine, Box 13P, Little Silver, N. J.

I WILL start you earning $4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operations. G. F. Redmond, Dept. 306, Boston, Mass.

MAIL Order Dealers! Advertisers! You need our 1913 Advertising Rate Book with the latest Dollar-making feature "Ads That Pay." Hot from the press! Gives you cost of Advertising in 2000 recognized magazines and newspapers, location, circulation, closing dates and other useful knowledge. Includes thirty original Mail Order propositions, winners every one of them. A $10,000 investment at your service. You can make a legitimate profit of 95c on every dollar order. This very valuable manual sent prepaid to you, for 10c. Write now! Dearborn Advertising Agency, 521 Dearborn St. Chicago.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voerhies, Desk C. B., Omaha, Neb.

AGENTS WANTED

AGENTS Wanted—If you know a chance when you see it you'll see one now. Big money—stylish, nifty clothes—little work—no experience or capital needed—can you beat that? We want agents everywhere to take care of our business in their localities and to advertise our nobby nifty suits by wearing them. We furnish everything complete and charge nothing for agents' outfit. The swellest dressers everywhere are our agents and all we ask is that you tell people who inquire about your fine clothes where and how they can get them. You make big money—$10 a day—without trouble. Just a postal brings you full outfit free. Big, new sample book of up-to-the-minute suitings sent so you can pick out your first suit; also measuring blanks and everything you need. We pay express on everything—not a penny for you to pay. Send quick before some one else gets the agency there—mail postal today to American Woolen Mills Co., Dept. 1014, Chicago, Ill.

IF you want something that's the thing right now—an article with which many agents, local and mail dealers are making $50 weekly, handle our triple silver-plated safety razor; guaranteed equal in merits, quality and appearance to any $5 razor! Write for wholesale prices and circulars furnished with imprint. Enclose 25c for sample, which amount may be deducted from first order, or, if razor doesn't shave better than any other, irrespective of price, we'll send your quarter back. Morgan Company, 312 Madison, Chicago.

YOUNG man, would you accept and wear a fine tailor-made suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use $5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000 write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 507, Chicago.

WANTED—Live wire specialty salesmen, district managers in West, Middle West and South, to sell the Schemmel Welding and Cutting Machine, which is self-generating and is the best on the market. Right men can make ten thousand dollars annually. Reference required. Must finance yourself. Full particulars first letter. Confidential. Davis Sales Co., Holliday Bldg., Indianapolis.

WANTED—Agents in every locality to sell the most positive exterminator of roaches, ants and water bugs ever offered. Every sale means a satisfied customer large commission; exclusive territory to right party; liberal proposition. Vestal Bros. Mfg. Co., Indianapolis, Ind.

AGENTS Wanted to sell America's leading non-skid tire protector. Men with automobiles who can devote all their time to the work preferred. Good salesmen can make from $50 per week up. Write for particulars. Leather Tire Goods Co., Niagara Falls, N. Y.

DEAD ones can succeed with our new household article; 1 to 4 in every city and village home; 100% profit. No competition. Sells for ten cents. Samples and proposition ten cents. Get in early. Ivor Glass Co., 293 E. 17th. Ave., Columbus, Ohio.

MAN made $5.50 one hour, girl $87 one week, selling Endless Neckties. Patented. Just show them—sell on sight. Look like any stylish neckties—tie in a different place each time; wear 20 times as long. Sample outfit Free if you mean business. Write Endless Necktie Co., Kansas City, Mo.

WHERE did your money go? Keep track of it. Begin any time with our Daily Expense Record, very interesting and complete, postpaid, 50c. Agents wanted. Auburn Supply Co., Dept. EX, 7745 Peoria St., Chicago.

AGENTS—$50 weekly. We manufacture the best needle case made; a wonderful seller; 200% to 500% profit; talking unnecessary; our "Trust Scheme" Envelopes do the work; general agents can make $100 weekly; particulars free; 25c sample outfit for 10c; buy direct from the factory. Paty Needle Co., 102 Davis Sq., W. Somerville, Mass.

HAND Power Vacuum Cleaner, carpet sweeper style, straight from carpet sweeper manufacturers of 13 years' standing and worldwide reputation. Sells on 2-minute demonstration to any housewife. Runs easy as a carpet sweeper and like one. Write for agents' terms. National Sweeper Co., 16 Laurel St., Torrington, Conn.

MAKE and sell your own goods. Formulas by Expert Chemists. We obtain your Government Serial Number. Catalogue for stamp. B. Mystic Company, Washington, D. C.

SALESMEN:—Working for us means cash in your pocket every day; Household Device; duplicate orders; profits big, experience unnecessary. Write immediately. Specialties Supply Co., No. 31 Willoughby Street, Brooklyn, N. Y.

AGENTS—If you don't make $4 profit the first day selling Tate's Dust Absorbing Dust Cloths, etc., return samples. Many Agents made $25. Write quick for particulars. Dept. B-4, Consumer's Direct Supply Co., Boston, Mass.

WANTED—Men and women over 18 for U. S. Government positions. $65 to $150 month. Thousands of appointments this year. Full unnecessary. Farmers eligible. Common education sufficient. Write for free booklet of positions open to you. Franklin Institute, Dept. T22, Rochester, N. Y.

MR. Mail-Order Man: Get quick returns. Established corporation supplies fast mail-order sellers; factory prices. Classy proposition. Beginners or established firms. Copyrighted Prospectus free. Mississippi Valley Co., Inc., Box N629, Pittsburg, Kans.

IMPROVED Automatic Razor Stropper. Something very fine for $2. Agents wanted. Auburn Supply Co., Dept. RZ, 7745 Peoria St., Chicago.

$75 MONTHLY and extra commission for selling our large new line with valuable premiums to customers. 72-page illustrated mail-order catalogs free to agents. Credit given. Best Mfg. Co., Div. 3, Providence, R. I.

AGENTS, Sign Men, positively make 500% handling our flexible letters, guaranteed unfamiliable; four styles, all sizes, lowest prices; prompt shipments anywhere. Anybody can put them up and make money—we will show you how. Particulars and instructions free; complete samples, 5c postage. New York Sign Leter Co., Arbuckle Building, Brooklyn, N. Y.

AGENTS:—Automobile necessity, every call a sale, 100% profit. In testing its salability, agents worked on salary, but later asked to work on commission. Very practical, sells itself. Write at once for free particulars. Woks Mdse. Co., Wesley, Iowa.

IF you want 100% to 500% profit quick, sell our assortment of practical and necessary articles for the home. Not found in any stores. Entirely new line at popular prices. Send today for descriptive catalog and terms to agents. Specialty Mfg. Co., 20 Brigham St., Westboro, Mass.

AGENTS make 500% profit selling our gold window letters, novelty signs and changeable signs. 500 varieties in enormous demand. Catalogue free. Sullivan Co., 1238 Van Buren St., Chicago, Ill.

WANTED—A man or woman all or spare time to secure information for us. Work at home or travel. Experience not necessary. Nothing to sell, good pay. Send stamp for particulars. Address M. S. I. A., 11 L. Bldg., Indianapolis, Ind.

$5 TO $20 daily to agents who are hustlers selling our new and wonderful line of goods. Large concern. Complete selling outfit free. Exclusive territory. Wm. J. Dick, Manager, Dept. B-4, Chicago.

AGENTS:—Big profits, quick seller, exclusive territory. New patented article needed in every home. $10-$12 daily profit easily made. Tech Sales Co., 1784 Broadway, New York.

ANYONE can attach. Gilding Casters. 400% profit. Carried in pocket. No rollers. Save floors, carpets, furniture. Cost 3c, sell 10c. Homes buy dozens. Best agent's article of the century. G. Mfg. Co. (Dept. 104), 20 Warren St., New York.

PHOTO Pillow Tops, Portraits, Frames, Sheet Pictures, Photo China Plates. Rejects credited. Prompt shipments; samples and Cat. free to agents. 30 days' credit. Jas. C. Bailey Co., Desk M4, Chicago, Ill.

WHEN you sell Feeny Vacuum Cleaners you make pleased customers. New principle—creates wonderful suction. One general agent's total commissions 1912 were $18,498. Write today for our attractive propositions. Feeny Mfg. Co., G28, Muncie, Ind.

YOU can't afford to accept ordinary proposition while agency for Guaranteed Aluminum Cooking Utensils is open. Answer quick. Protected territory. American Aluminum Mfg. Co., Dept. P.M., Lemont, Ill.

$35 TO $100 weekly made easily. Needed in every home and store; enables purchaser to save money and enjoy life. Rapid seller, profit from $10 to $50 each sale. Experience unnecessary; exclusive territory to hustlers. Write for full particulars. C. Hempie, Sales Mgr., 174-C, No. Sangamon Chicago.

AGENTS Wanted—Right here is the one big chance of your life. If you want to make good money—$10 a day or more, as easy as rolling off a log, and get your swell clothes free besides, you can do it by acting as our agent. We are the biggest people in the business and want our agents to make big money and be nifty, stylish dressers. Send a postal today for free $10 outfit, including big book of nobby suiting samples to select your swell agents' suit from. Then take orders from people who admire your nifty clothes. They come to you—not you to them. This is the way to get rich—the sure, easy way. Remember, you need no money—everything is furnished by us free. We pay express on everything. Just send a postal, but do it today. You can't get started too quick, making this big money and wearing these stylish clothes. Address card to Paragon Tailoring Co., Dept. 1014, Chicago, Ill.

SELL something new and in great demand. Savir Stove Lids save half of coal. Thousands used. Agents making big money. Write for free trial offer. Pre-Heated Air Co., Suite 634, 1011 Chestnut St., Phila.

AGENTS, write for particulars; device for saving fuel on gas, oil and gasoline stoves; exclusive territory given general agents. Gas Saving Grate Co., Columbus, O.

AGENTS Can Earn $5 to $10 per Day Selling Our Many Patent Specialties. Write today for full list and proposition. Ford Mfg. Co., Inc.; 5-7 Oliver St., Newark, N. J.

AGENTS Wanted—To sell lubricating oil and grease in rural districts. Samples supplied. Write for particulars. Caledonian Oil Co., Inc., 135 Front Street, New York City.

AGENTS, either sex, for our Polypin; never before sold in this country; 100% profit; also other articles. Write quick. Rubenik Mfg. Co., 3227 Delmar, St. Louis, Mo.

REMNANT Store, 1331-E. Linn, Cincinnati. Greatest Dry Goods Bargains on Earth. For agents and store-keepers.

AGENTS—Portraits, 35c. Frames, 15c. Sheet Pictures, 1c. Stereoscopes, 25c. Views 1c. 30 days' credit. Samples and catalog free. Consolidated Portrait Co., Dept. 3242, 1027 W. Adams St., Chicago.

NEWEST Door Plate, never tarnish; low price; equal to any $3 plate. Free sample to workers. Gross, 2463 Washington St., Boston, Mass.

MANUFACTURE "Substitute for Gas," sells like wildfire, no canvassing necessary, enormous profits. Particulars free. W. C. Delzell, 311 South Fickett, Los Angeles, Cal.

AGENTS, best seller in Christmas season; very rare and newest Japanese novelties that we have ever seen. Sample 25c. Ozuka Co., 1134 Georgia St., Los Angeles, Calif.

SAFETY razor—big seller; agent's sample 20c. Special prices quoted in quantities. Breckenridge, Box 49, Station H, New York.

SEND for booklet, "How You Can Become Your Own Master Without Capital;" no competition. Daugherty, 1236 Madison Street, Chicago.

I NEED one energetic, dependable representative in every county to take orders for our new Popular Mechanics book for boys called "The Boy Mechanic." This is not a story book, but a wonderful and interesting collection of 700 things boys love to make and experiment with. A very large attractive book for the price, $1.50. Every boy's father or mother will want to buy it for their son. Right now is the most opportune time to start on account of the approaching holiday season as this is an unusually attractive gift book. It sells itself. Good liberal commission and exclusive territory. You don't have to be a professional agent to be successful with this highly meritorious proposition. Work in and around your home town. Write today for full particulars to Manager Book Dept., Popular Mechanics Co., 318 W. Washington St., Chicago.

JUST Out—Practically an every-call seller. Agents wanted. Moore Co., 35 E. Bethune, Detroit, Mich.

100% PROFIT—San-A-Ta-Ree Dustless Dust Cloths; ready sellers. Agents, General Agents' proposition ready. Parker, Box 93, Waterbury, Conn.

USE your selling ability to build a big business of your own. Free book, "Skilled Collecting," tells how. Collectors' Ass'n, 36 Long Street, Newark, Ohio.

WIDE-AWAKE agents make big money handling our easily demonstrated specialty. Particulars free. Write today. Cupies Sales Company, Dept. S, Big Flats, N. Y.

AGENTS wanted for good selling preparation. Barkley's Manufacturing Company, Blairsville, Pa.

AGENTS are making big money selling our new line of household goods. Send for sample and particulars. Rippon Mfg. Co., 338 Hugo Street, San Francisco, Cal.

"BOOSTER" will show you how to make more money! Operate a good, substantial Mail-Order Business—our "Silent Salesman" system can easily be worked during spare time. Don't invest any money until you read "Booster"—the magazine that has, for years, actually and accurately started others like you in business for themselves by publishing money-making propositions that get the dollars. Send 10c today—it's worth dollars to you. Booster Magazine, Northwestern Building, Chicago.

SIGN Agents—Painters—Something new and better. Attracto ready-made Gold and Silver letters. 21 kinds, easily applied. Make big money lettering store windows, making signs, and selling our line of flashing, sparkling chipped glass name plates. No experience needed. Write for sample letter and catalogue and start at once. Address Attracto Sign Co., 2655 North Clark Street, Chicago.

CREW Managers! General and Local Agents! Two Million Dollars' worth of Oil Mops are being sold annually. Our new invention will double this first six months. Nothing like it. Every improvement the people have wanted. Agency means a monopoly. Liberal proposition. Big opportunity. Act quick. Frederick Mfg. Co., 11th floor Marbridge Bldg., New York City.

AGENTS—Here is a tailoring proposition for you. We are not offering anything free or making any foolish promises, but we can show you how to make good money and build up a permanent business. We make suits to order at wholesale prices. Our $16.50 suits as good as others at $25. No experience necessary. Can hold your present position and make good money with this besides. Highland Tailoring Co., Department 26, Cincinnati, Ohio.

WE only want a few honest, hard-working men to sell our full line of Everbrite Gold Glass Sign Products. Salable in every city in the country. Customers in most instances are boosters—help you sell. When writing for catalogue state experience. Sales Dept., Chicago Glass Novelty Co., Marion, Ind.

AGENTS—Every merchant and professional man a prospect. Sell our complete line of high quality, low-priced Window Letters, Glass Signs, Name-Plates and Wood Specialties. Write to us now for New 48 page catalogue and Sample Letter—Free. Attracto Sign Co., 2655 North Clark St., Chicago.

FOUNTAIN Oiler just invented, prevents accidents in oiling machinery. Most convenient oiler for places hard to reach. Mills and factories purchase by the dozen. Specially adapted to automobiles and power boats. Quick profits for prompt agents. Sample 50c; set of five $1.50 prepaid. Selective Supply Co., Lynn, Mass.

A MILLION Men Want Prest-O-Lather shaving brushes. Makes its own lather. Bristle stay set in rubber. Smoothest shave ever. Rivaling "Gillette" sales. No competition. General Agents make $72 weekly. Send $1 for sample and agency terms. Prest-O-Lather Co., Dept. P, South Bend, Ind.

$10 AND only one sale a day. You can make one sale, as our goods almost sell themselves. Just think of it, some of our men make three sales a day. Why not you? Get busy—write quick while the place is open. Advance Mfg. Co., Kalamazoo, Mich.

FULLER Dustless Floor and Wall Mop, with adjustable handle, and hand duster are indispensable to housekeepers—sell at sight—100 per cent profit to agents. Write today. Fuller Brush Co., 55 Hoadley Pl., Hartford, Conn.

$35 WEEKLY easily made as our Sales Representative for automobile supplies and devices. No experience necessary. Exclusive territory to wide-awake salesmen. Economy Auto Supply House, 607 Crilly Bldg., Chicago.

AGENTS—It's the goods, our household specialties clear you $35-$65 weekly and repeat orders on first delivery. Sterling Aluminum Co., Canal Station 77, Chicago.

GENERAL Agents Wanted to Sell Ink Powder through our original "approval plan" envelopes; no talking required; big profits; sample package 10c. Delbert McDonald, P506 S. Cedar, Sturgeon Bay, Wis.

$27 DAILY profit sounds good. Let us prove it. Get in the game. Excelsior Mfg. Co., 117 Worth St., New York.

GENERAL Agents—Capable of calling on the big trade themselves and handling canvassers for the house to house and office to office business, to sell the newest electric specialty on the market; sold everywhere there is electricity, in the home, office, factory, store, hotel; liberal profits; sales-driving sample, weighs a pound; no experience or knowledge of electricity required: shows how to use one light instead of two and get the same results; sells for $2.50, $3.50, $5 and saves the purchaser an investment of $25. Write for particulars. The Handy Light Co., 159 Handy Light Block, Cincinnati, Ohio.

THEODORE Roosevelt is again writing for Scribner's Magazine. Subscription solicitors can earn big commissions. Inquire Desk 15, Scribner's Magazine, 597 Fifth Ave., New York.

AGENTS—Sell Shav-Ite Shaving Cream. Free premiums. Exclusive territory. Samples prepaid 24c. Thomas Mears, 1148 La Salle Ave., Chicago.

AGENTS—250% profit. Wonderful little article. Sells like wildfire. Can be carried in pocket. Write a: once for free sample. H. Mathews, 1962 Third St., Dayton, Ohio.

UNUSUAL Profits—"The New Asbestos Inner Soles" mean warm feet in coldest weather. Exclusive territory. Two dimes and stamp bring samples and wholesale terms to agents. The Anderson Mfg. Co., Box 1747, Pittsburgh, Pa. Established 1910.

$20-$40 WEEKLY selling guaranteed Hosiery, Underwear, Sweaters, Neckties, Handkerchiefs. Credit. Samples free. Sales Manager, Room 811, 366 Broadway, N. Y.

NEW Improved Self-Heating Flatiron; burns gasoline, alcohol, kerosene. Make $20 a day. Fulton Supply Co., 1608 Fulton St., Chicago, Ill.

AGENTS Wanted—A brand new 25c household article that will clear you $10 per day for the next 6 months. Write quick. J. S. Ziegler Co., Chicago.

CASH for names, information, formulas, ideas, etc. Steady home business. Instructive book for stamp. Information System, 396 Marietta, Ohio.

AGENTS—Mail Order Men: Your 25-word ad in 100 Magazines $1. Box 22, Station B, Worcester, Mass. The Williams Specialty Co.

AGENTS—Get particulars of one of the best paying propositions ever put on the market. Something no one else sells. Make $4,000 yearly. Send postal today for particulars. E. M. Feltman, Sales Mgr., 6718 Sycamore St., Cincinnati, O.

AGENTS—$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

HOUSEHOLD Specialty Agents. Send stamp for sample dish cleaner and catalog of helpful household conveniences. F. C. Hanson, Southbridge, Mass.

AGENTS—Ten Dollars a day. New Adding Machine. Guaranteed five years. Price $5. Phelps Specialty Co., Dept. M, Caro, Mich.

AGENTS—Weeping Doll, patented, very laughable. Lemon Company, Brighton, Mass.

AGENTS—Your profit 76 cents on best selling dollar specialty ever invented. George Sypher, 6557 Minerva Ave., Chicago.

AGENTS—You can sell our raincoats. Anyone will buy. We put one on your person. Outfit free. A. Temple Raincoat Co., Templeton, Mass.

AGENTS—Inquire household article that sells; big profits. A. H. Busch, 1306 Gregory, Wilmette, Ill.

AGENTS—A device that saves money, increases efficiency, adds to comfort, convenience; beautifies the home, office and store—and is electrical—is the kind of device to sell. Show these features on an article to the people today and your sale is made. I have that article. If you are alive, wide awake and want to handle a general agency for the most unique, electrical specialty, which will cut lighting bills in half, write for my proposition. Stanley B. Freiberg, 195 Station F., Cincinnati, Ohio.

AGENTS—To sell the newest electric appliance on the market; sold everywhere there is electricity, in the home and office; liberal profits; sales-driving sample, weighs a pound, no experience or knowledge of electricity required; it shows how to use one light instead of two and get the same results; sells for 3.50 and saves the purchaser an investment of $25. Write for particulars. The Handy Light Co., 111 Handy Light Block, Cincinnati, Ohio.

DEVOTE your whole or part time in dignified remunerative business. Take orders for best tailoring house in America. Complete outfit free containing 400 latest patterns and styles. Every garment guaranteed. Exclusive territory. Davidson, Sales Manager, 503 South Franklin St., Chicago.

VACUUM Cleaner Agents, here it is; absolutely new design in wheel-operated, powerful bellows-type vacuum cleaner; new visible nozzle; exclusive appearance; sells quick at $7.50; write for particulars about money-back guarantee now. Doty Company, Box 500, Dayton, Ohio.

WE furnish you capital to run a profitable business of your own. Become one of our local representatives and sell high-grade custom-made shirts; also guaranteed sweaters, underwear, hosiery, and neckties, direct to the homes. Write Steadfast Mills, Dept. 10, Cohoes, N. Y.

AGENTS—Earn $10 per day. Sell three 50c Ties, $1.00. Free Monogram Gold Cuff Links and Stick Pin. Bowden cleared $71—5 days. Cooper, $40—4 days. Free samples. Comer Neckwear Co., 2 First St., Dayton, Ohio.

WIDE-Awake, active agents can secure special concessions and reap benefit from best money-making agency proposition on the market by writing immediately for full particulars. Hugro Mfg. Co., 427 S. Dearborn St., Chicago.

SALESMEN making small towns, Whole Time or Side-Line, should carry our fast-selling pocket side-line. Special sales plan allowing return of unsold goods makes quick, easy sales. $4 commission on each order. Something Entirely New. Write for outfit today. Cenfield Mfg. Co., 206 Sigel St., Chicago, Ill.

AGENTS—Greatest offer ever made. Eleven-piece toilet article set and $1 carving set. All cost you 50c; sells for $1; twenty sales a day easy. Write today. Pierce Chemical Company, P-3, Pierce Bldg., Chicago.

OVER $10 profit each sale. Energetic salesmen everywhere to sell Good Health Electric Vibrators; big demand, easily sold, quick action necessary. Good Health Vibrator Co., 806 N. Clark St., Chicago.

ONE person wanted each locality as general agent for complete line Polish Mops, Self-Wringing Mops (5 styles), Fibre Brooms. Hilker Mop Co., 1201 Grand Ave., Chicago.

LIVE Wire Salesmen wanted to introduce a sure winner; 100 per cent profit. Particulars free. Edward Munson Co., Decatur, Ill.

HOSIERY; knit ties; sample free. Sutton sold gross each week besides hosiery. 100% profit; appoint sub-agents, develop permanent, profitable business. Credit. Colby Hosiery Mills, 2832 Kensington Ave., Philadelphia, Pa.

AGENTS, canvassers, crew managers, salesmen wanted in every community for our famous 7 and 8 cake $1 soap assortments; advertising price 25c; costs you 12½c; attractive premiums given; everybody buys; lose no time getting our list money-getters. Moore Bros. Co., Manufacturers, Established 1890, 288 Greenwich Street, New York.

AGENTS—Money maker—we manufacture glass paper. Makes common window glass look like real art glass. Easily applied. Beautifies the home. Two sample sheets. Catalogue in colors 10c. Parrish Co., Lakeside Bldg., Chicago.

GET in the big-money class. $35 to $75 a week. Our new, stylish, snappy, double texture, $5 raincoats sell rapidly to men and women everywhere. Big commission for you. Write now for agency. Regal Raincoat Co., Albany, N. Y.

LEARN Metalizing Transform Roses, Carnations, Butterflies, etc., into exquisite jewelry novelties. Big profits. Dime brings rosebud pin and particulars. P. Benson, Stewartville, Minn.

BOKARA Diamonds—Agents, everyone, to wear and sell our famous Bokara Diamonds. Write for sample offer and catalogue free. Northwestern Jewelry Co., 2141 Summerdale Ave., Dept. 28, Chicago.

AGENTS—$50-$75 weekly selling guaranteed knit-goods for largest mfg. manufacturer in America. Write for free outfit and particulars of greatest money-making proposition ever offered. Madison Knitting Mills, 486 Broadway, New York.

AGENTS. Big money made daily selling an article for automobiles and motorcycles. Saves 50% of gasoline. Increases power 20%. Moller Brothers, Main Office and Factory, Lewistown, Pa.

AGENTS—100% profit—sell to saloons—machine whirlwind seller. Free sample and salesmanship course. Two sales a day $15 profit. Write. Simplex Mfg. Co., Kewanee, Ill.

MAIL-ORDER Opportunities: 25 new Propositions. No competition! Make 95c profit on dollar order; complete outfit 10c. Mail Dealers Wholesale House, 521 Franklin Bldg., Chicago.

400% PROFIT — Manufacture Barley Crisp—new confection—whirlwind money-maker. Women and men can do it. Send for free Crisp. It's fine. Simplex Mfg. Co., Kewanee, Ill.

AGENTS—Sell good repeater. 100% profit. Samples. Piscataqua Sales Co., 25 Tanner St., Portsmouth, N. H.

WATER Filters costing 2c sells 10c. Detroit Filter, Detroit, Mich.

READ the Agents' Magazine. Make more money, 2 months, 10c. Agents' Magazine, Chicago.

AGENTS—Defy competition selling our untarnishable gold and silver sign letters. Highest grade goods, rock-bottom prices. Dime brings 5 large samples and instructions. Particulars free. H. Alexander, manufacturer, 980 Third Ave., New York. Established 1905.

MAKE money in land sales. No large capital needed. Opportunity right in your own locality. Send 50c for complete instructions. Do it now. New Era Specialty Co., Morton, Pa.

SELF threading needles. 10c a paper. Agents' samples and terms free. Ladies' Art Co., Dept. 41, St. Louis, Mo.

AGENTS—To introduce Oxo-Gas; a wonderful new invention; a complete individual gas plant for lighting, cooking, heating; cheaper to install and operate than any other known fuel. For cooking it is cheaper than coal or wood. For lighting it is cheaper than a common kerosene oil lamp. The most brilliant light known to science. Gloria Light Company, 1281 Washington Blvd., Chicago, Ill.

BE Our Agent. We make the best Vacuum Sweeper manufactured. Women are crazy for them. We will sell you one at lowest agent's prices. Test it at home. Show it to other women tired of sweeping, dusting, etc. Take their orders and make money for yourself. Write at once for agency terms. The Junior Vacuum Cleaner Co., Dept. A, Bradford, Pa.

AGENTS in every city to handle our Triplex Folding Handbag; big profits; exclusive territory. Write for terms and free catalog. Other big sellers. S. V. Diamond & Bro., 35 West 21st St., New York City.

WE are the largest manufacturers of Twisted Wire Brushes in America. Highest grade goods, best service, highest profit. Write for our new catalog. You are sure to win. Fuller Brush Co., 33 Hoadley Place, Hartford, Conn.

(CELLULOSIA) Door Plates, new lettering pure gold. Send for sample case. Nothing invested. 100% profit, sell to every house. Public demands them. La Fontaine, Mfr., Sherburne, N. Y.

AGENTS wanted. Live wire canvassers. An undoubted winner. Appeals to best in profession. High-class specialty. No competition. Sells $3, costs half. Unlimited field. Save-Life Window Cleaner Co., 36 East Main St., Amsterdam, N. Y.

SIGN Painting Agents: 1000% profit. Best and cheapest window letters made. Mounted sample free. Success positively guaranteed. Embossed Letter Co., 235 West Illinois St., Chicago.

HOUSEHOLD article. Saves 80%. Universal demand. Agent's commission 120%. Sample free. Craig Brothers, Detroit, Mich.

AGENTS, make $35 weekly selling the Empress Dustless Dust Cloth. Something entirely new and needed in every home. Send 25c for sample and particulars. Empress Specialty Co., 5702 Easton, St. Louis.

AGENTS—$35 weekly distributing needle cases; sell 115 needles in book for 10c; make 200 per cent profit; send 10c for sample and full particulars; general agents wanted. Empress Specialty Co., 5702 Easton, St. Louis, Mo.

MANUFACTURER of new exclusive linen heel and toe guaranteed hosiery wants agent in every county. Sales enormous. Re-orders insured; permanent, increasing income. Protected territory. Credit. N. Parker Mills, 720 Chestnut St., Philadelphia, Pa.

AGENTS wanted for a new household labor saver. Quick seller. Big profits. Cary-Dane Co., 102 West 101st St., N. Y.

YOU can be your own boss with our Key Check Outfit. Good for $5 a day stamping names on pocket key checks, fobs, etc. Sample check, with your name and address, 15 cents. Pease Die Works, Dept. M, Winchester, N. H.

AGENTS—Handkerchiefs, Dress Goods. Carleton made $8 one afternoon; Mrs. Bosworth $25 in two days. Free Samples. Credit. Stamp brings particulars. Freeport Mfg. Company, 59 Main St., Brooklyn, N. Y.

400% PROFIT selling our high grade work. Samples free. Gordon Co., Northwestern Bldg., Chicago.

ATTENTION, Agents—"Mop, Vacuum, Crew Managers, etc."—Our indestructible cleaning, polishing and dustless mop, just patented, sells at sight, pays 150 % profit. Make $10 to $15 per day easily. Exclusive territory to business producers. Wonderful opportunity. A record-breaking proposition. Act at once. Duncan Brothers, 2424 W. Division St., Chicago.

WANTED—Hustlers to take orders for Made-to-measure high grade men's tailored suits from $9 to $22. You can make good money. Elegant large book outfit free. Experience unnecessary. No pocket folder affair. Splendid opportunity to make money. Handy Dandy Line, Dept. K, Sangamon St., Chicago.

BE Independent—Start a mail order business in your own home; we tell you how and furnish everything needed, wholesale; an honorable and profitable business for man or woman. Many make $3,000 a year. Particulars free. Murphy Mfg. Co., South Norwalk, Conn.

AGENTS—Salary or commission. Greatest seller yet. Every user pen and ink buys on sight. 200 to 500 per cent profit. One agent's sales $620 in six days; another $32 in two hours. Monroe Mfg. Co., X 6, La Crosse, Wis.

AGENTS sell rich-looking imported 36x68 rugs $1 each. Carter, Tenn., sold 115 in four days, his profit $57. You can do as well. Write for sample offer and selling plan. Sample rug by Parcel Post, prepaid, 98c. A. Condon, Importer, Stonington, Maine.

SILVER'S Ten Best Sellers are big business builders for agents. New, novel; every home a customer. Immense profits for agents who act quickly. Write today. Silver-Chamberlin Co., Dept. M, Clayton, N. J.

ABSOLUTELY Free for 30 days only. One dozen guaranteed U. S. Fire Extinguishers with order for 3 dozen. Special offer to one representative in each section. United Mfg. Co., 1025 Jefferson, Toledo, O.

AGENTS to take orders for visiting and business cards; large commission; outfit free. Forman Printery, Waterbury, Conn.

ONE Million Agents Wanted. Fast sellers costing 2c, selling 25c, in quantities to $50. Every firm needs. Postal brings samples. Embossed Co., 235 West Illinois St., Chicago.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 406 N. Clark St., Chicago.

AGENTS—Our Wonderful Luminous Crucifix; selling better than ever. Some territory still open. Shines all night in darkest room. Write for agency. Pioneer Portrait Company, 1259 W. 63rd St., Chicago.

AGENTS—$5 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

AGENTS—250% profit. Wonderful little article. Sells like wildfire. Can be carried in pocket. Write at once for free sample. H. Mathews, 1962 Third St., Dayton, Ohio.

AGENTS: Cost 2c, sell 25c. Sign letters put on with roller. Samples free. Embossed Letter Co., 235 West Illinois St., Chicago.

AGENTS wanted for oriental novelties. Never before introduced. Quick sellers. Repeaters. Immense profits. Particulars free, or samples 25c. Kanemats, Box H-529, Portland, Oregon.

I WILL start you earning $4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

PERFECTION Pocket Adding Machine. Lightning seller. Agents wanted. Cincinnati Specialty Mfg. Co., Dept. R, Cincinnati, Ohio.

AGENTS make $5.00 to $10.00 a day at the start. Atkinson writes: "The best proposition I have found in my forty years canvassing." Permanent work. Household necessity. Saving 80%. Write to-day for General or Local Agents terms. Free sample. C. H. Stuart & Co., 16 Union St., Newark, New York.

500% PROFIT selling our wonderful sign letters for office windows, store fronts and glass signs; resembles finest gold leaf; easily applied; samples free. Metallic Letter Co., 406 N. Clark St., Chicago.

SOAP agents make more money selling the celebrated Linro line. Coffee, flavorings, spices, soaps, perfumes, and 135 other items. Big commissions to you. Exclusive territory. Freight allowed. Handsome premiums to your customers. Free sample case. No deposit required. Free catalog. Linro Company, 13 Linro Bldg., St. Louis, Mo.

MEDALLIONS—300% profit. Make up your own goods and be independent. Catalogue free. Resag Co., 1205 Randolph St., Chicago.

AGENTS make $30.00 weekly selling our 500 Handy Household Articles; catalogue free. Scheff Company, Desplaines, Ill.

AGENTS Wanted—Mechanics and shopmen make over $100 a month in spare time selling transparent handled novelty knives and razors. Big profits. Sales easily made. Write for terms today. Novelty Cutlery Co., 67 Bar St., Canton, O.

YOU can make $$$$ as our general or local agent. Household necessity; saves 50 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pitkin, 113 Redd St., Newark, N. Y.

STOP Here! Let me start you in a home business that will bring you money every day. Experience unnecessary. Spare time. No canvassing. I furnish everything and guarantee success. Send for proofs. Voerhies, Desk C. R., Omaha, Neb.

AGENTS Wanted—Men and women to sell "Sun" Self Heating Irons. An extraordinary opportunity to make big money by devoting whole or part time to a dignified, congenial business, established for years. Strictly high-grade, simple and indestructible. Thousands in use. Every sale makes many more sales. "Sun" Irons sell themselves. Women buy at sight. A penny's worth of gasoline or alcohol is sufficient for an entire family ironing. We manufacture and guarantee every iron. Write quick. Address, The Modern Specialties Mfg. Co., 109 High St., South Bend, Ind.

DOGS, BIRDS AND POULTRY

SEND for our Special offers on German Canaries, cage, seed, etc., goldfish and aquariums; these make acceptable gifts for mothers, wives, sweethearts, weddings, birthdays. Write today; you'll be pleased. Edwards Bird Store, Detroit, Mich.

ROSE Comb Buff Leghorns; the coming breed; domesticated mallard ducks; fancy pigeons. Frank Morris, Galena Road, Aurora, Ill.

MAKE money at home raising Rabbits, Pigeons, Poultry. Three books telling how for $1. Hardy's, Oakland, Cal.

PETS—Send for our 34-page catalogue of pets, such as dogs, pups, birds, pet animals of every description. The Original Cugley's, 52 N. 9th St., Philadelphia, Pa.

FOR Sale—Blue-ticked fox hound; will guarantee him first-class. Frank Cooper, 19 Mill St., Meriden, Conn.

2,000 FERRETS. Prices and book free. N. Knapp, Rochester, Ohio.

FOR Sale—Thoroughbred Persian kittens and grown stock. E. D. Shakey, Durand, Ill.

PURE Bred—Coon, cat, deer, rabbit, wolf and foxhounds, trained and untrained. Ten days' trial allowed. J. E. Adams, Herrick, Ill.

SCOTCH Collies, imported strains; also choice fox terriers. The Edgevale Kennels, Wadena, Minn.

TRAINED Beagles, Rabbits, Hounds, Fox Hounds, Coon, Opossum, Skunk, Deer, Bear, Wolf-Hounds, Setters, Pointers, and Ferrets. Brown's Kennels, York, Pa.

AIREDALE Terriers and Scotch Collies. State wants? Sales list free. Phil Savage, St. Charles, Ill.

OFFICE EQUIPMENT

For Sale—Mimeograph machine slightly used, cheap. 3859 Coral St., Phila., Pa.

HELP WANTED

BIG money writing songs—We have paid thousands of dollars to song writers—send us your poems or melodies. Acceptance guaranteed if available by largest, most successful concern of the kind. We publish, advertise, secure copyright in your name and pay 50 per cent if successful. Hundreds of delighted clients. Write today for Big Magazine, Beautiful Illustrated Book and examination of your work—all free. Dugdale Co., 265 Dugdale Bldg., Washington, D. C.

WANTED—Men and Women over 18 for U. S. Government positions. $65 to $150 month. Thousands of appointments this year. Full unnecessary. Farmers eligible. Common education sufficient. Write for free booklet of positions open to you. Franklin Institute, Dept. T21, Rochester, N. Y.

WANTED—A resident Sales Agent and Manager in your home county for the Benefiel Handi-Tool. One tool combining a fence machine, wire stretcher, post puller, lifting jack, press, cable maker, vise wrenches, etc. For Farmers, Teamsters, Contractors, Factories and others. Guaranteed for life. Experience not necessary. We start you with handsome outfit, exclusive territory, and new plans. Art catalogue and complete prospectus free. Chas. E. Benefiel Co., 1608 Telephone Bldg., Indianapolis, Ind.

U. S. GOVERNMENT wants city mail carriers, postal clerks. $65 to $100 month. Nov. examinations everywhere. Farmers eligible. Full description free. Franklin Institute, Dept. T21, Rochester, N. Y.

YOUNG man, would you accept and wear a fine tailor-made suit just for showing it to your friends? Or a Slip-on Raincoat Free? Could you use $5 a day for a little spare time? Perhaps we can offer you a steady job. If you live in a town smaller than 10,000 write at once and get beautiful samples, styles and this wonderful offer. Banner Tailoring Company, Dept. 508, Chicago.

LEARN automobile repairing, driving on up-to-date cars; electrical, civil engineering, surveying; methods most practical; room and board while learning; positions secured; satisfaction guaranteed; catalog free. National School of Engineering, 2110 West Seventh, Los Angeles.

GOVERNMENT wants mail carriers, postal clerks. $90 month. Particulars free. Franklin Institute, Dept. T21, Rochester, N. Y.

WANTED—Dictaphone Typists; without shorthand; $12 to $18 per week to start and profitable employment, while learning at home in thirty days, guaranteed. Typo Equipment Company, Consumers Bldg., Chicago.

MEN of ideas and inventive ability should write for new "Lists of Needed Inventions," "Patent Buyers" and "How to Get Your Patent and Your Money." Advice free. Randolph & Co., Patent Attorneys, Dept. 35, Washington, D. C.

GOVERNMENT jobs open to men and women. $65 to $150 month. List of positions free. Franklin Institute, Dept. T21, Rochester, N. Y.

I WANT a man as local manager who is accustomed to earning big money. Must be reliable and well connected. Can show such a man how to clear $100 every week this winter. C. Gilbert, Suite 629, 1011 Chestnut St., Phila.

BIG money selling our line! $10 to $50 profit on each sale. Great demand. Experience unnecessary. Exclusive territory to hustlers. Write C. Hemple, Sales Mgr., 174-D, No. Sangamon, Chicago.

BIG Profits—Open a dyeing and cleaning establishment, little capital needed. We teach by mail. Write for booklet. Ben-Vonde System, Dept. C, Charlotte, N. C.

AGENTS make big money and become sales managers for our goods. Fast office sellers. Fine profits. Particulars and samples free. One Dip Pen Company, Dept. 2, Baltimore, Md.

OCTOBER examinations everywhere for Government Clerks at Washington. $75 month. Specimen questions free. Franklin Institute, Dep't T21, Rochester, N. Y.

WANTED—Electrical instrument makers for work in connection with our Experimental Department in the development of electrical meters. Address "Employment," P. O. Box 911, Pittsburg, Pa.

CASH for names, information, ideas, formulas, etc. Steady home business. Instructive booklet for stamp. Nat'l Information System, 307 Marietta, Ohio.

GET prepared for Government "Exams" by former United States Civil Service Secretary Examiner. Like Popular Mechanics, I offer no premiums, have no "Positions Guaranteed" or "Coaching Free" Schemes. Straight propositions. Booklet C without obligation. Write now. Arthur R. Patterson, Rochester, N. Y.

CITY mail carriers wanted. $90 month. Apply Franklin Institute, Dep't T21, Rochester, N. Y.

$$$$ REPORT local information, names, etc., to us. No canvassing. Spare time. Exceptional proposition. Enclose stamp. National Information Sales Company, BCH, Cincinnati.

WANTED—Investigators and Detectives. $150 to $300 per month. Some traveling positions. Free particulars. National Detective Agency, Dept. W-3, Chicago.

WANTED—Picture Play Writers. Big pay. We will teach you. Address United Picture Play Association, San Francisco.

$10 TRIPLE Bellows Vacuum Cleaning Machine $4.65. F. L. Sparks, 12 Isabella St., Worcester, Mass.

HERE'S a life income! Your back yard or a city lot is good for thousands yearly, under my instructions. The new industry, now making fortunes, is at your disposal. I have put thousands on "easy street" with my unique "Schemes in Dirt." If tired of work and worry—write me. My "Post Bulletin" explains and I'll help you to an easier income. This current number 10 cents. Benjamin Burdick, Kalamazoo, Mich.

ANY intelligent person may earn steady income corresponding for newspapers. Experience unnecessary. Address Press Correspondence Bureau, Washington, D. C.

BE a detective. Big wages, traveling everywhere. Write Detective Johnson, Department 37, Houseman Blk., Grand Rapids, Mich.

TWENTY-FIVE intelligent, tactful and aggressive salesmen to handle an entirely new and necessary furnace utility. If you can qualify, write us at once. Jackson Utility Co., 224 W. Cortland St., Jackson, Mich.

WRITE Moving Picture Plays. $10 to $100 each. Constant demand. Devote all or spare time. Experience, literary ability or correspondence course unnecessary. Details free. Atlas Publishing Co., 3645 Atlas Bank Bldg., Cincinnati, Ohio.

MACHINISTS Wanted—Floor hands and erecting men for heavy hoisting engines and mining machinery. Address Litchfield Foundry & Machine Co., Litchfield, Ill.

GO on the Stage. Vaudeville career offered you. Experience unnecessary. Managers endorse my method. Instructive vaudeville book free. Write today. Frederic LaDelle, Sta. 10, Jackson, Mich.

NO expense to learn electricity, automobiles, plumbing. Correspondence lessons furnished; then actual work on contract jobs. Your work pays expense; 300 students last year. Get free catalogue. United Trade School Contracting Co., Los Angeles.

WANTED—Distributors, men and women, to give away free packages our famous Perfumed Borax Soap Powder; no money or experience needed; good pay. S. Ward & Co., 218 Institute Place, Chicago.

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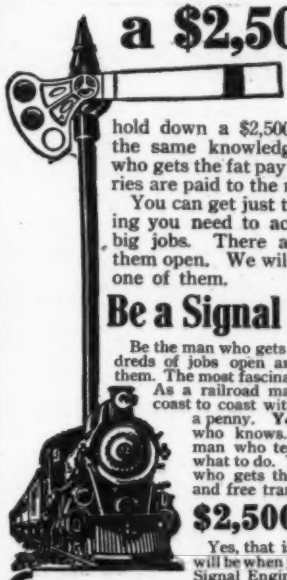

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Continued from page 26

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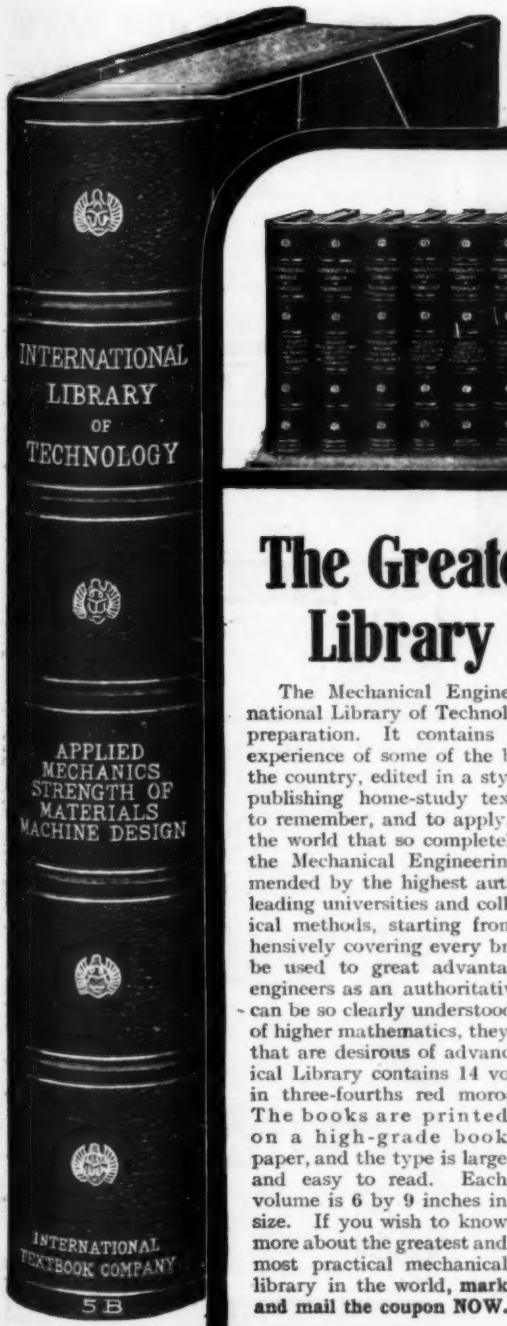

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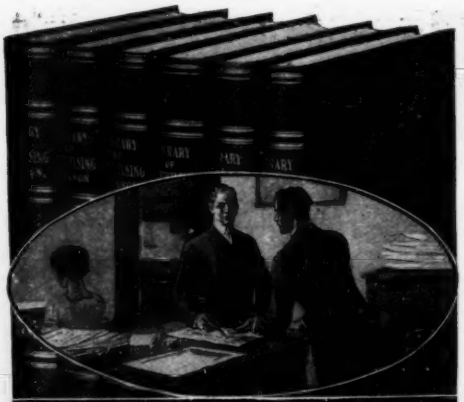

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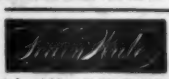

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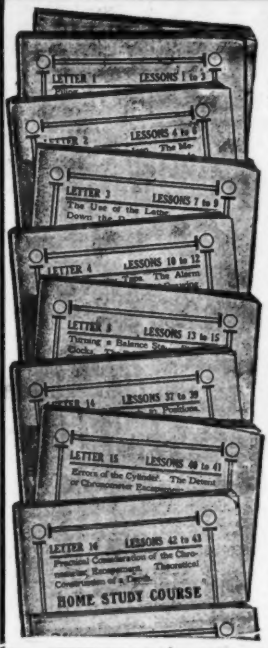

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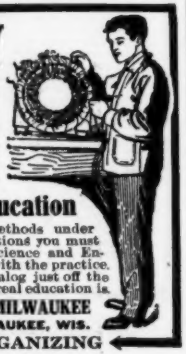

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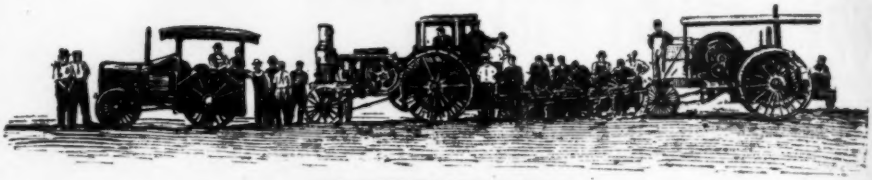

OUR THREE TRACTION ENGINES

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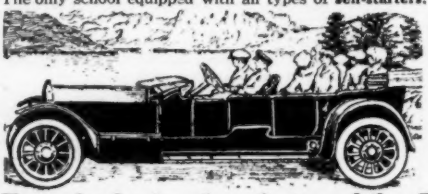

$50 Course Free to Men Who Answer This Advertisement

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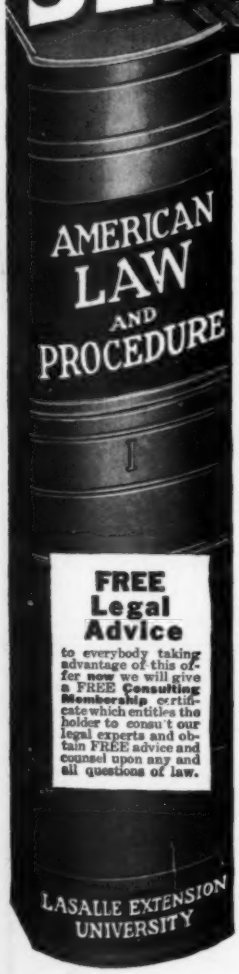

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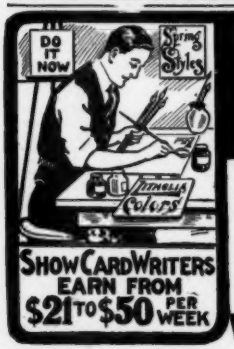

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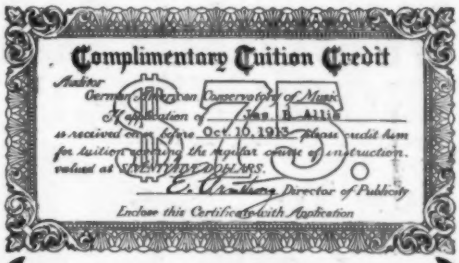
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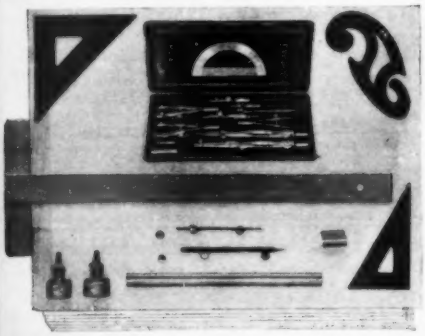

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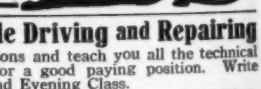

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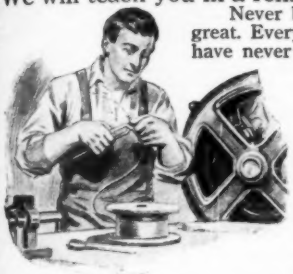

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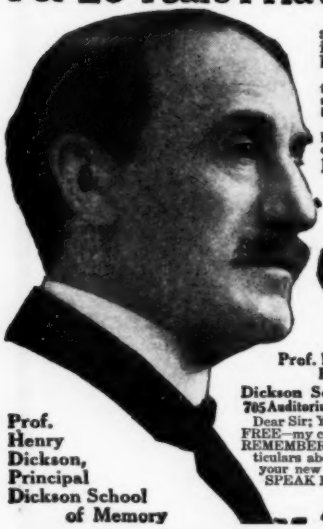

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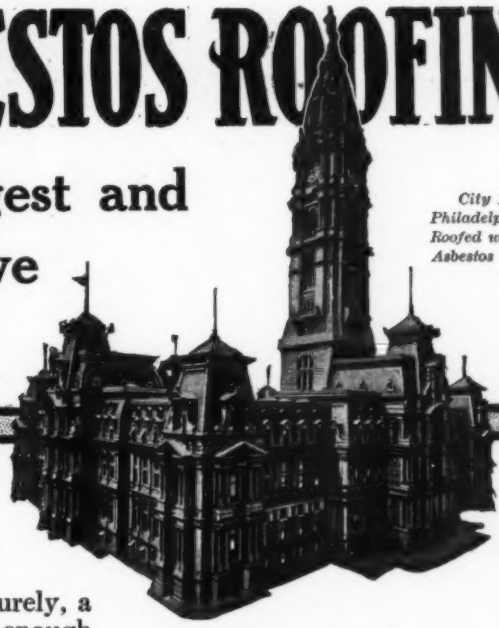

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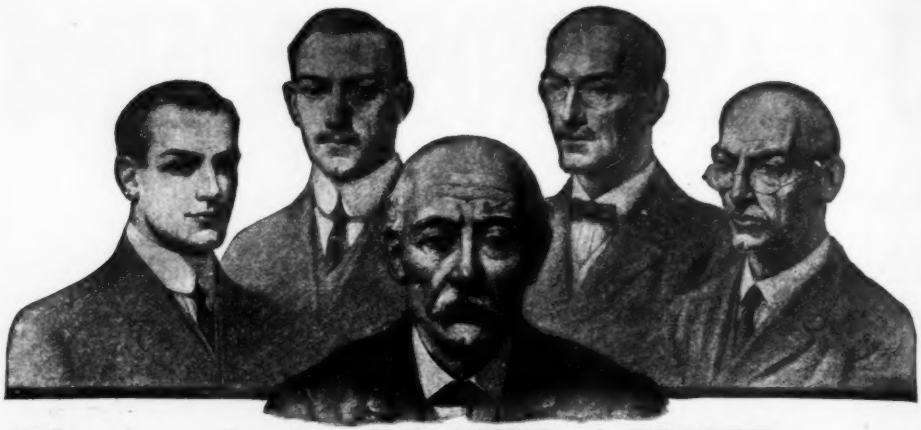

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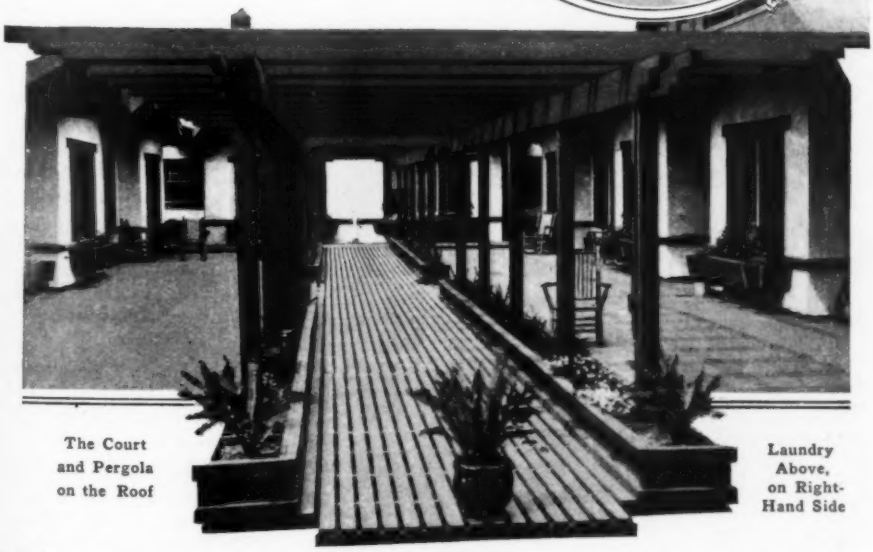
Vol. 20 OCTOBER, 1913 No. 4

Second-Story Bungalow Apartments

A COLONY of one-story bungalows built about a court on the roof of a block of stores is a new idea in apartment houses which has recently been realized in Long Beach, Cal. From the street the bungalow apartment building looks like an ordinary

One-Story Bungalow Apartments about a Court on the Roof of a Business Block

Sheltered Porch with Entrances to Two Bungalow Apartments; Clothes Drying on Roof



The Court and Pergola on the Roof

Laundry Above, on Right-Hand Side

brick business block with shops below and flats on the second floor. But the stairway from the street, instead of leading to a second story, takes one to a broad, sunny court on the roof of the shops. Down the center of the court is a pergola with flower boxes beneath it, and around the four sides are the low gables of 17 one-story Swiss-chalet bungalows. Flower boxes under the

windows, and plaster walls trimmed with dark wood make them look like a row of bungalows on the street. In all there are two 2-room, four 3-room, and eleven 4-room bungalow apartments about the court. Each pair of bungalows has a common sheltered porch, recessed so that the entrance doors open into the living rooms. Their kitchens and dining rooms face the court and their living and sleeping rooms overlook the street. Each has its own bathroom and plenty of closet room. The common laundry is not in the basement, but on the roof of one of the bungalows, and clothes are hung out on the roofs of the kitchens unseen from the street below. The floor of the court is covered with heavy deck roofing, drained by a gutter in the center, and garbage is taken care of in boxes with ventilating pipes leading through the roof.

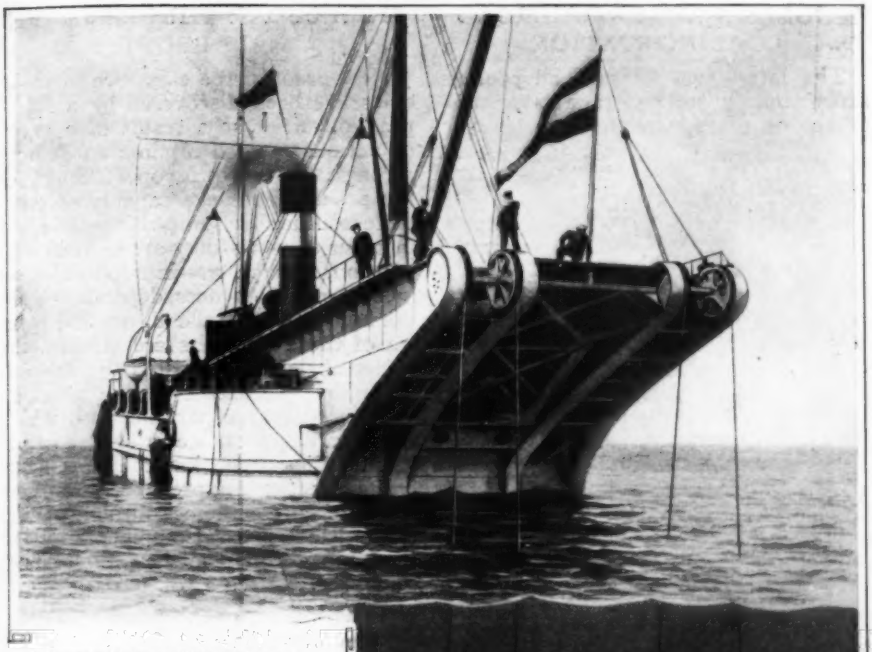
TIMING CAMERA SHUTTERS WITH ARC LIGHTS

A method of testing the speed of camera shutters with the aid of an

Alternating-Current Arc Lights Used to Test the Speed of Camera Shutters: Each Dot on the Negative Indicates an Exposure of $\frac{1}{120}$ Second

alternating-current electric arc light, without any revolving wheels, swinging pendulums, or other apparatus, has been worked out by a Chicago man. It is based on the fact that an arc light flickers, or rather goes out and relights, once for each alternation in the current, or twice per cycle. That is, in the 60-cycle type of alternating current, usually supplied for street lighting, the current alternates and the arc flickers 120 times a second. If a camera with open shutter pointed toward the light is swung across the light, the resulting negative will show a line of dots. And each dot represents an alternation or $\frac{1}{120}$ second of exposure. For example, if a camera is moved across the light during the tripping of the shutter and the resulting negative shows 30 dots, then the shutter was open $\frac{30}{120}$ second and its speed is ¼ second. This method cannot be used with direct-current arcs because they do not flicker, and the only result is a solid streak on the negative. A simple way to test the current is to watch a shining object—a knife blade, for instance—as it is moved through the light. Alternating current will make it look like a picket fence. The number of alternations per second in the current must of course be ascertained.

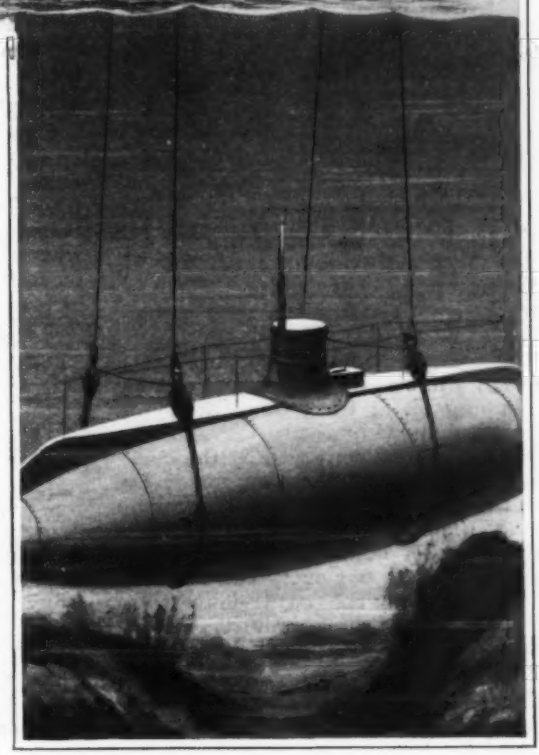
¶The Post Office Department is being urged from many quarters to install shower baths in all city post offices, particularly for the benefit of the mail carriers, many of whom walk from 15 to 20 miles a day in the performance of their duty. The newest of the large post-office buildings are now equipped with facilities of this kind.



A German Salvage Ship Raising a Sunken Torpedo Boat in the North Sea

SALVAGE SHIP RAISING A TORPEDO BOAT

A salvage ship recently built for the German navy is shown in the accompanying photograph raising a submarine torpedo boat. The hull of the torpedo boat, "No. 178," which was run down and sunk near Heligoland in the North Sea during the naval maneuvers this summer, was recovered in this manner.



¶ The use of ammonia bombs to extinguish forest fires is being tested in some of the national forests. In the case of brush fires, the fire fighters often have difficulty in getting near enough to beat out the flames, and ammonia bombs have been found very effective. The explosion of a single bomb will extinguish fire in a 15-ft. circle about it.

MODERN TYPE OF RAILROAD COALING STATION

The latest type of railroad coaling station has a steel storage tank supported on a steel trestle directly over

Modern Coaling Plant Hoists and Delivers Coal Automatically

the tracks and so arranged that the coal flows by gravity through chutes into the engine tenders below. At one side of the tracks is an elevator shaft, 75 ft. high, in which two buckets work alternately, thus partly counterbalancing each other, while taking the coal from the dumping pit at the foot of the shaft. Coal is dumped by the carload into this pit, and is then conveyed by the buckets, which fill and dump automatically, to the top of the shaft into the storage tank. The tank is 24 ft. in diameter. Each bucket holds a ton of coal and makes a round trip every two minutes, and in this way the coal is delivered at the rate of one ton a minute. A gasoline engine supplies power for hoisting.

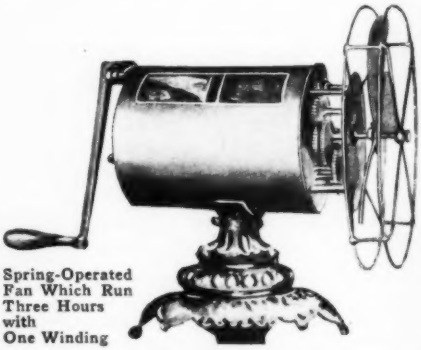
¶A lock of wool, 4½ ft. long, was recently exhibited in Australia.

MOLECULAR THEORY GIVEN NEW PROOF

New proof of the existence of molecules has been discovered by a European physicist as a result of a study of various colored organic substances through the spectroscope. Some of these substances are capable of complete solution in some solvents, while in other solvents they are held in suspension, broken up into particles of greater or less fineness, depending upon the liquid. When the absorption spectra of these solutions are studied, the colors absorbed vary slightly, depending upon the nature of the solution. And the finer the particles into which the organic substance is broken while it is held in suspension, the more nearly its spectrum approaches the spectrum of a complete solution of the same substance. Complete solution thus appears to give the limit of fineness, the molecule, of particles held in suspension.

SPRING-OPERATED FAN RUNS AT UNIFORM SPEED

One of the greatest objections to spring-operated fans is apparently overcome in a fan recently invented and placed on the market, the mechanism being such that the current is as strong when the spring is nearly run down as when the fan is first started. This fan



Spring-Operated Fan Which Run Three Hours with One Winding

is made in two diameters, 10 in. and 16 in., and is capable of three hours of sustained service with one winding.

THE NEW WATER SPORT—RIDING ON A PLANK

Water planing on a plank towed by a speedy motorboat is one of the most exciting water sports that has become very popular this season. It is hardly to be recommended to women and children, but for a good swimmer it is almost as thrilling as flying. All that is necessary for the sport is a fast motorboat and a strong plank, 6 ft. long and 2 ft. wide, with a tow rope attached to the front end and two reins for the rider to use in maintaining his balance. The rider, necessarily in a bathing suit, stands on the rear end of the plank and jockeys the reins to keep his balance and guide his craft. Standing still, the plank is hardly sufficient to support a man, but at eight miles an hour it begins to ride lightly on the water just like a hydroplane. As the speed increases to 25 or 35 miles the front end of the plank rises high above the water and the craft skims the surface on its "heel." Skillful balancing will take it around sharp turns without capsizing, and by a slight shifting of the weight, it can be made to climb sideways on the waves of the motorboat's wake. The sport comes from South America and was described in Popular Mechanics Magazine some time ago. Its American popularity began on the Pacific coast early in the summer. In August plank skimming appeared on Lake Michigan, at Chicago, and a company has now been organized to manufacture the equipment for the sport.

The New Water Sport: Riding a Plank behind a Motorboat at a Speed of 35 Miles an Hour

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¶ That ancient instrument of martial music, the drum, has been cast out of service in the French army.

HOW FOUNDATION TESTS ARE MADE

For determining the stability of the underlying clay or other material on which the foundations are to rest, systematic tests are now made on the sites of Federal buildings before the work of construction is started. On the site of the post office at Newcastle, Ind., four shafts were sunk to a depth of about 18 ft. A framed column supporting a platform was erected in each shaft, and each of these platforms was then loaded with four tons of pig-iron slugs. These were allowed to stand for a specified time and the slight changes in level were noted by the engineer in charge of the work. In this way the stability of the clay footings was determined before the foundation work was begun.

Getting the Bearing Power of the Clay Underlying a Foundation

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¶ Practically all the street cars, electric lights and industrial motors in St. Louis, Mo., are now supplied with current generated by the turbines at the big dam at Keokuk, Iowa, the current having been turned into the wires on July 1. This is the largest city in the country supplied with hydroelectric power.

MILLIONS A YEAR SPENT ON MUSICAL INSTRUMENTS

An army of nearly 42,000 workers is now engaged in making pianos and organs in the United States, according to the last census, and about $30,000,000 is paid them for their work. In 1909, the value of the products they turned out almost reached $90,000,000—over seven times the value of the industry's total output in 1869. But the number of factories is decreasing; small firms are giving way to huge corporations. Of the 374,154 pianos, valued at nearly $60,000,000, that were built in 1909, about 98 per cent were uprights and some 40,000 had mechanical-player attachments. Half of the $5,000,000 spent on organs in that year went into pipe organs, although they were outnumbered 50 to 1 by reed organs. The phonograph and graphophone industry is increasing faster than all the others and now amounts to about $12,000,000 a year, equally divided between machines and records. On the other hand, and probably as a result, every year brings a decline in the number of band and orchestral instruments produced.

THE WOOL INDUSTRY IN AMERICA

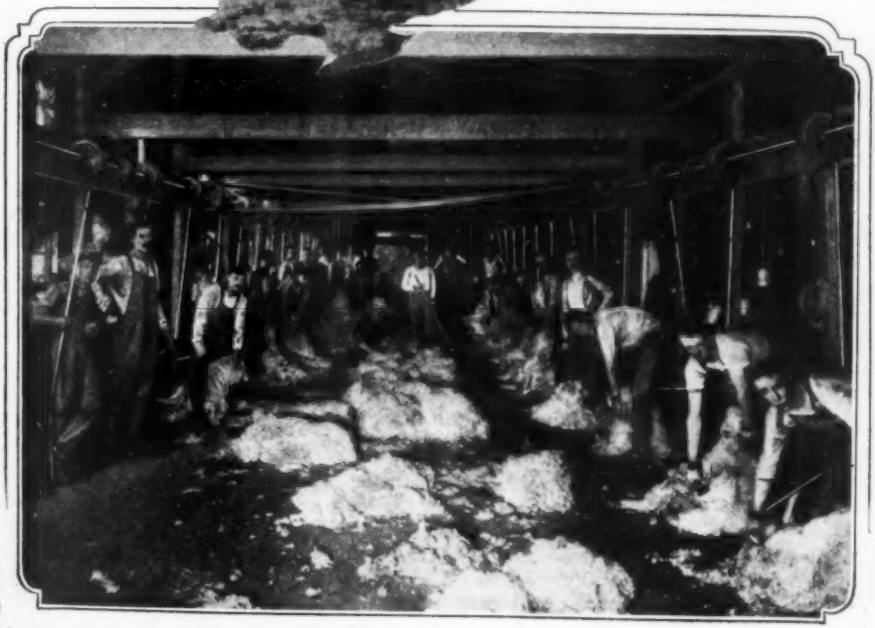
Few people realize the immensity of the wool industry in the United States and at the same time its relative insignificance when compared with other farm products. Although there are nearly 53,000,000 sheep, worth approximately $235,000,000, in the country, they represent less than five per cent of the total number of domestic animals on American farms, and only about ten

per cent of our farms raise any sheep at all. Yet almost 43,000,000 sheep are sheared every year and the resulting 289,000,000 lb. of wool are worth over $65,000,000. Over 50 per cent of the sheep are on the large ranches of the West, especially in Wyoming and Montana. In some eastern states, Ohio, for instance, sheep raising is carried on to a large extent on small farms. The illustrations show the contrast between the wool industry of the East and of the West.

This Automobile is Used by an Indiana Wool Buyer to Handle the Output of Three Counties; It Carries 650 Lb. at a Load

Over $10,000 Worth of Wool being Carted to the Railroad from One Wyoming Ranch

Below: Power Shearing Machines Used on a Large Sheep Ranch in Wyoming



FIRST TELEGRAPH-OFFICE SITE IS MARKED

A bronze tablet in memory of Samuel F. B. Morse, inventor of the electric telegraph, has been set up to mark the

Tablet Which Marks the Site of the First Telegraph Office Opened by Prof. S. F. B. Morse on April 1, 1845

site of the first public telegraph office in the United States which Professor Morse opened on April 1, 1845, under the direction of the Post Office Department. The site is on Seventh Street, one of Washington's principal business streets, and is now occupied by a general land-office building. The tablet was unveiled on July 4.

PRESSURE COOKING ADAPTED TO HOME USE

Steam-pressure cooking, which is used in canning factories because of its economy and efficiency, has been made possible in the home by the invention of a small pressure kettle for family use. Pressure cooking is economical because water boiled under pressure is hotter than water boiled in an open kettle, and it is efficient because the vapors of the food cannot escape and the confined dry steam breaks up the tissues and fibers of meats and vegetables. A pressure cooker, used on any fire like an open kettle, requires less heat than a "fireless cooker," cooks very rapidly, and cannot boil dry or burn the food. The patented pressure kettle is made of heavy aluminum with an air-tight cover held in place by thumbscrews. A pressure gauge, calibrated to 30 lb., a safety valve, and a release cock, on the lid, make the pressure cooker safe for family use.

SMOKE ABATEMENT BY ELECTRICITY

Electricity appeared as a solution for the smoke problem in a demonstration at Pittsburgh recently. The smoke-abating appliance which was shown removed the soot from 900 cu. ft. of smoke a minute at a total cost of about one cent a day for operation. The action of the apparatus consists in precipitating the solid particles in the smoke by means of a powerful electrical current, and its invention is based on the fact that one-third to one-half of the solid matter in smoke from smelting furnaces consists of particles of iron oxide. Electrical current is applied to the smoke by means of a wire woven through a number of small pipes placed at the top of the chimney so that the smoke must pass through them. As soon as the electricity is turned on the small particles floating in the smoke are changed to large particles which fall back into a bin by their own weight. Its application is not confined, however, to smelting furnaces, for it has been found that the device works as successfully on any kind of smoke, cement or ore dust. Soft coal and ashes were used in the demonstration. As soon as a patent has been obtained the appliance will be placed on the market.

PORTABLE LAWNS OF GRASS CARPET

Living-grass carpets that can be used as table covers, coats, or for making temporary or permanent lawns are now manufactured in England. They are really living carpets, for the

Laying Down a Strip of Grass Carpet to Make a Permanent Lawn: The Grass Carpet can be Handled as Roughly as a Rug

grass with which they are covered continues to grow in whatever place or use the carpet is put. To make them, millions of grass seeds are sown on a strip of carpet in a greenhouse and allowed to sprout and grow. When the grass has taken root, the carpet can be handled like a rug. If a temporary lawn is desired, the ground is rolled and the carpet is laid down in strips; afterward it can be taken up and used elsewhere. When it is allowed to remain in one place, it takes root and forms a beautiful lawn. An entire lawn can be laid in a day and two lengths of carpet will make a cricket pitch.

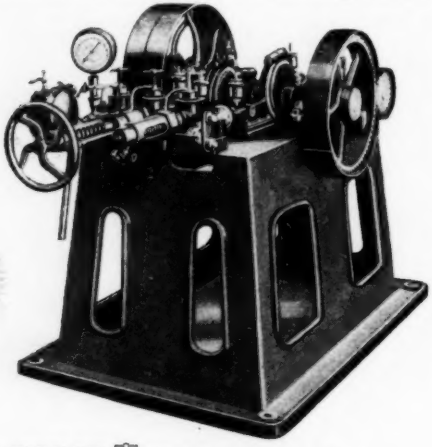
The Grass Carpet Used as a Cloak

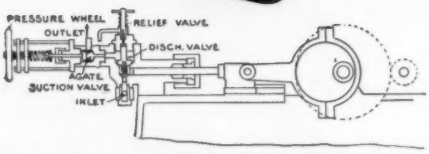
A Tea Table Covered with a Spread of Growing Grass

Courtesy of The Sketch

MAKING RICH CREAM OUT OF BUTTER AND MILK

Just at this time when cream shortage resulting from the increased manufacture of ice cream is becoming one of





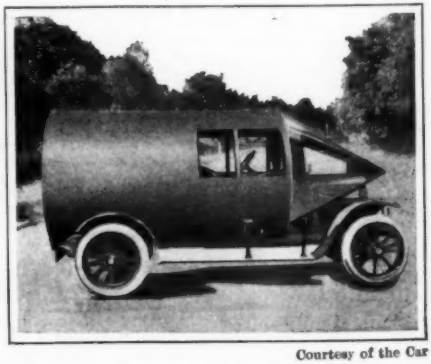
Above: Homogenizer Used in Ice-Cream Factory to Make Rich Cream Out of Butter and Skim Milk

Below: Diagram of the Homogenizing Machine Which Crushes the Fat Globules in Milk

the great dairy problems, a machine has been invented which enables ice-cream manufacturers to make usable cream out of butter and skim milk. The process is called homogenizing. It consists of breaking up butter-fat globules in milk so that they cannot rise to form cream, and was invented originally to make milk more digestible. All milk, as is well known, contains about 87 parts of water and 13 parts of solids; and the greater portion of the solids is made up of minute globules of butter fat. As these globules are lighter than the rest of the milk, they rise to the surface to form cream. Homogenizing breaks up the fat globules with pressure and makes them an integral part of the milk. The machine used, called the homogenizer, consists of a triplex pump, with a suction and discharge valve on each cylinder. In each discharge pipe is a homogenizer, like a safety valve, which remains closed until the pressure rises to 2,000 or 3,000 lb. per square inch, and when it opens, the space between a ground agate disk and the seat of the valve is so narrow that fat globules cannot pass out without being crushed into particles so small that they will not again separate from the milk. The machine homogenizes from 60 to 400 gal. an hour with a small amount of power. By the process, 4-per-cent milk becomes as rich as 10-per-cent milk, and 25-per-cent cream, homogenized, tastes like 50-per-cent cream. In the ice-cream industry homogenizing is used to put fat globules back into milk. When fresh, unsalted butter is added to skim milk heated to 180 deg. and run through the homogenizer, the resulting combination is richer, smoother, and better suited to ice-cream making than ordinary cream, and a great saving of dairy products results.

MOTOR-CAR BODY PROVIDES ADVERTISING

One of the latest advertising novelties is a motor delivery van used by a pencil manufacturer, in which the body of the car is made to represent the sharpened end of a pencil. The pencil portion is removable, and the car can be converted into an ordinary two-seater with a rumble seat in the rear.



Courtesy of the Car

Motor Delivery Van Used by Pencil Manufacturer

The NEW IDEA In PUBLIC PLAYGROUNDS

By Grant M. Hyde

THE playground movement in America is rapidly becoming a municipal affair, largely because it is developing a new purpose, that of teaching children how to play and directing their play along lines that are useful and instructive.

In trying to direct the play of American youngsters, the playgrounds are making a great number of interesting experiments. Some playgrounds are merely a bit of park or a vacant lot set aside for the children, with or without attendants to direct the play. Others, developed with a more or less instructional purpose, are laid out in public-school yards and have teachers to manage them. Still others have the social center or community idea behind them and provide amusement for grown-up visitors, as well as play for the children. The idea of directing play in some cities takes the movement beyond the limits of a playground, and the young people are sent outside the city on directed excursions and into summer camps.

One playground in New York City occupies a site that is valued at $1,800,000, but this is unusual. Vacant lots in congested districts, areas useless for commercial purposes, and bits of land in out-of-the-way places are rapidly being made into playgrounds. Philadelphia has laid out tiny playgrounds under railroad viaducts; Reading, Pa., has a playground on the concrete roof of a water reservoir; Springfield, O., is utilizing the grounds around a city standpipe. Amusement piers have been built in some cities, and Boston has floating bathhouses for the small boys.

Certain standard forms of play and apparatus are pretty generally present in all playgrounds. Swings, seesaws, slides, giant strides, and gymnastic apparatus are always the first things that are provided. Swimming pools are quite as common. For the smaller children, most playgrounds have sand piles and wading pools. The love of competitive play has brought facilities

One of the Many Branches of Playground Instruction: Basket Weaving

for group games—baseball, tennis, basketball, volley ball, and, in some places, football and lacrosse. These are for the older children, but war games, "hikes," hare and hounds, folk dances, and other games, invented sometimes by the attendants

and sometimes by the children themselves, are being developed for the little tots. In some cities the competitive games of the larger boys have grown into organized athletics with playground teams and interplayground games and track meets. All furnish play under direction.

Directed play naturally leads to instruction through play. In many cities, such as St. John, N. B., there is regular kindergarten work for little children. In others, sewing,

The Ever-Popular Swings, at East Liverpool, O.

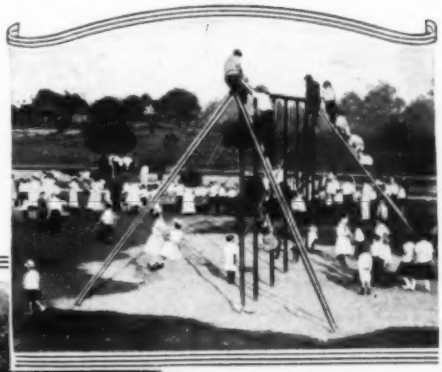
One of the School-Yard Sand Boxes at Reading, Pa.

Dancing Class on Roof of a Reservoir at Reading, Pa.

embroidery, basket and raffia work are provided for the older girls, along with manual training and gardening for the older boys. Springfield, O., has this. New Orleans has regular gardens laid out in the playgrounds and prizes are given for the best crops raised by the children. In Glen Ridge, N. J., and other cities, manual training and cooking are moved from the schoolhouse to the summer playground. Columbus, O., and Holyoke, Mass., do the same thing by teaching the older boys to clean the playground and erect and repair the apparatus. At Youngstown, Pa., the boys dug their own swimming pool on the playground and made water wheels.

Where attendants can be afforded, play is directed into beneficial physical

training; games are made into marching and setting-up exercises. Swimming is taught almost everywhere. Johnstown, Pa., has boys' and girls' brigades to turn recreation into healthful exercise. Music added to the marching and setting-up work turns them into drills and folk dances; many playgrounds make folk



Outdoor Gymnastic Apparatus in Jacksonville, Fla.

Bamberger Park Playground at Dayton, O.

There Are Always Wading Ponds and Sand Piles for Little Tots: This One is in Philadelphia

dancing a regular part of their instruction, and dramatic pageants are very common. St. John, Canada, has systematic musical drill, and to the idea of the folk dance, Kalispell, Mont., has added Indian dances in costume. But the development of music in connection with play necessarily brings parents and older visitors to the playgrounds. Where a playground has a boys' band, as in Jacksonville, Fla., the community idea necessarily follows, for the parents come to hear their children play. Many cities provide music on the playgrounds with the direct purpose of bringing the parents. Holyoke, Mass., has regular band concerts on the playgrounds, and Springfield, O., has vocal and orchestral concerts, evening lectures, and com-

munity meetings as an adjunct to children's play. The idea of training the young for citizenship and self-government is beginning to appear; New Orleans is just now making plans for the establishing of self-governing "playground republics."

Many novelties in methods and apparatus have been brought out in various parts of the country. East Liverpool, O., has found that if hammocks are provided, the smaller children can be persuaded to sleep in them during the afternoon, benefiting both themselves and the playground's peace. Croquet and quoits have appeared among the other games at Springfield, O. Kite day is a regular feature at Akron, O. The boys on one of the playgrounds at Buffalo revived the old pastime of stilt walking and the city had a hundred pairs of stilts made for them. Competitive athletics for the boys brings very complete organizations in many cities. At Jacksonville, Fla., regular athletic meets and an annual circus are held; East Liverpool, O., has organized playground teams and interplayground leagues. These in connection with interschool leagues in the larger cities develop an interest in athletics which keeps the small boy out of much mischief. In Oakland, Cal., 14,220 playground baseball games were played last year.

Restful recreation, on the other hand, has its place. Twilight story telling on the playgrounds is becoming very common. An attendant who can tell stories to a group of children at certain hours of the day, especially in the early evening, develops their imaginations and instructs them at the same time. This feature of playground entertainment has been found very successful at Columbus and Springfield, O. To the story telling, Youngstown, O., has added phonograph concerts and moving pictures on the playgrounds. One of the most unusual features that have developed is the fly-swatting contest held on a playground in New Orleans. Prizes were offered for the largest number of flies killed, and 32 children exterminated 4,474,750 flies in about two weeks.

New ideals of usefulness are being developed as the playground becomes more of a municipal affair. When it came into existence, a few years ago, it was entirely in the hands of voluntary organizations of citizens, and most of the necessary money was secured by subscription. This is still true in many cities. But more and more aid is being given to playground associations by city governments, and in many cases the playground is a municipal matter. In one instance, in fact, it has become a state affair. The appointment of a city commission to manage public recreation has meant in most cases the adaptation of the playground to the widest practical use. Philadelphia, in arranging her playgrounds, is considering the parent as well as the child. Orange, N. J., has arranged to keep her playgrounds open every day during the year, including Sundays. Working children are considered in Buffalo, and her playgrounds are kept open at night especially for them; even a twilight playground baseball league has been organized. Many cities have found that, although the playground is of greatest service during the long school vaca-

The Swing's Closest Rival, the Slide, at East Liverpool, O.

The School-Yard Playground as It is Laid Out in San Francisco

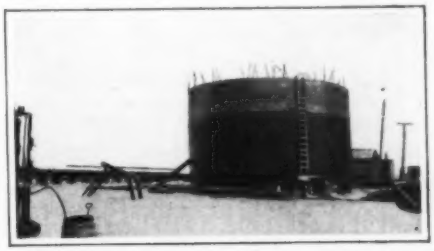
The Small Figures in This and Other Illustrations are Trophies Given for Playground Games in Various Cities

tion in the summer, winter amusement must not be neglected. An opportunity for skating and safe winter sports is often afforded by flooding and freezing the playgrounds in winter. Little by little municipal recreation is growing beyond the confines of the playground. Directed excursions and picnics for the children are common in many cities. Vancouver, B. C., provides trips to the beach as a regular form of amusement. In Philadelphia, the summer camp for city children has been taken over by the city.

Nearly 500 cities now have public playgrounds and about half of them receive municipal support. In 257 cities last year over $2,500,000 was spent on 1,543 playgrounds, and 4,132 attendants were hired. Of these playgrounds, 215 were open in the evening. One purpose actuates the management of most of them—to provide play under intelligent direction.

NOVEL METHOD OF BUILDING LIGHTHOUSE BASE

The base of a lighthouse to be located near the upper end of Delaware Bay is, in effect, an enormous reinforced-concrete tub, which is being built on dry ground and which will be towed later to the site of the lighthouse and sunk in the required position. This method of preparing a base is not uncommon in bridge building, but has not, so far, been used in lighthouse construction in the United States. Its principal merit is that it eliminates the necessity of building cofferdams. The base is 18 ft. high and has walls 18 in. thick, the height being such that the top will be clear of the water at high tide. The concrete filling which will be used in weighting and sinking the base will become a permanent part of the lighthouse structure.



Lighthouse Base That will be Towed Like a Boat to a Final Location

AROUND THE WORLD IN THIRTY-FIVE DAYS

The world's record for globe-trotting, which has stood for five years, was broken this summer by John Henry Mears, a reporter on a New York newspaper. He traveled around the world from New York City to New York City in 35 days 21 hr. 35 min. $\frac{4}{5}$ sec., returning to the newspaper office $\frac{4}{5}$ of a second behind his schedule.

Since the time when Jules Verne's character, Phineas Fogg, made his imaginary trip around the world in 80 days, various travelers have broken his record. In 1889-90, a newspaper woman known as "Nellie Bly" journeyed from New York to New York via the Mediterranean and the Indian Ocean in 72 days 6 hr. 11 min. The completion of the Trans-Siberian Railway offered a chance to beat her record, and in July and August, 1911, André Jager-Schmidt, representing a Paris paper, circled the globe from Paris to Paris in 39 days 19 hr. 43 min. 37$\frac{4}{5}$ sec. This record stood until this summer, when the establishing of faster liners across the Pacific Ocean offered a new opportunity. Mr. Mears' methods of travel were not as various or romantic as Phineas Fogg's, but what he lacked in Indian elephants he made up for with motorboats, flying boats, and automobiles. And while Phineas Fogg was unheard of during his 80 days, the wireless telegraph enabled Mr. Mears to report his location daily.

At 12:43 a. m., July 2, Mr. Mears left his office in New York and 14 minutes later was aboard the liner "Mauretania," sailing toward England. He landed at Fishguard, Wales, on July 7 and by the evening of the next day had hurried to Paris, by rail and steamer, with a few hours of sight-seeing in London. The Nord Express, leaving Paris at 1:45 p. m. on July 9, landed him in Berlin early the next morning, two hours behind his schedule. The same evening he was aboard the Russian Mail on his way to St. Petersburg. The evening of July 11 found him at Dwinsk, Russia, and the next afternoon he was in the Russian capital, 420 miles farther, on time. Before evening he was on the Trans-Siberian Express, starting out on his 11-day journey to Vladivostock. All went well until the train reached Ekaterinburg, just beyond the Ural Mountains, in the extreme eastern part of European Russia. There, on July 14, the 13th day of his trip, the express was held up 18 hours by a washout, and the rest of the journey to Vladivostock became a race to make up the lost time, for if he was to catch the fast Pacific liner from Yokohama, Mr. Mears could not be more than four hours late. On the evening of July 15 he was at Chelyabinsk, Russia, only a few miles from Ekaterinburg, and the next evening at Omsk, Central Asia, the train had made up only an hour. Between there and Krasnoyarsk he made up another hour, but when the train reached Irkutsk, Siberia, halfway between St. Petersburg and Vladivostock, on July 18, it was still 10 hours behind its schedule. July 19 brought him to Chita, Siberia, 500 miles farther, 8½ hours late and still 1,100 miles from Vladivostock. No time was made up between there and Manchurie, Manchuria, and so on July 21, when he reached Harbin, he changed his plans. He left the slow express and boarded a special train furnished by the South Manchurian Railways to take him to the seaport of Fusan, Korea. Down through Mukden, Manchuria, and Antung, Korea, his special made 60 miles an hour, in time to catch the ferry at Fusan to take him across the Japan Sea. He was three hours late at Fusan, but the ferry waited, and 10 hours later he stepped ashore at Shimonoseki, Japan. The Imperial Government Railway of Japan hurried him in a special train to Kobe, Yamakita, and thence to Yokohama. At 1:05 p. m. on July 24, he was in Yokohama, with five hours to spare for a side trip to Tokio.

The third leg of the race began that evening when he boarded the newest of trans-Pacific liners, the "Empress of Russia," for the 8½-day trip to Victoria,

B. C., 4,259 nautical miles away. Out in the Pacific Ocean he lost a day of his life. All during his eastward journey he had been gaining on the sun, and as he crossed the 180th meridian, just south of the Aleutian Islands, he was a full day ahead. The steamer broke all records across the Pacific and on Aug. 1 a wireless announced that she would reach quarantine at 2 a. m. next morning, 10 hours ahead of time. But a heavy fog settled during the night and she was delayed until noon. A fast power yacht was waiting for Mr. Mears to take him to Seattle in six hours, in time to catch the North Coast Limited for Chicago that evening. But rough water made speed impossible for the motorboat and when part way to Seattle he was transferred from the motorboat to a flying boat. The Northern Pacific had held its morning train one-half hour waiting for him, and the North Coast Limited was held 15 minutes until he ran aboard at 7:10 p.m.

Route of the Globe Trotter Who Broke the World's Record and Traveled Around the Earth in 35 Days

The last leg of the trip was the fastest and easiest. Between Seattle and Spokane, the train lost an hour because

of a washout, but this was made up, and Mr. Mears arrived in Chicago on the evening of Aug. 5, on time. At 11:30 p. m. he was speeding toward Cleveland. In the morning he changed to a faster train at Cleveland and a few hours later he boarded the Empire State Express at Buffalo. As the train drew into the Grand Central Station, New York, he was exactly on his schedule, but he lost four-fifths of a second on his way to his newpaper's office, where he arrived at 10:18:00⅘ p. m., on Aug. 6. Two washouts and a fog had almost spoiled his chance of breaking the record, but in each case the courtesy of railroad companies saved him from failure.

NEW MOTORCYCLE STAGE TRICK

One of the first successful motorcycle tricks introduced upon the vaudeville stage is illustrated by the accompanying picture. It was invented by an English performer and consists of riding a motorcycle on the top of a large wheel which revolves backward like a treadmill. The large wheel is 12 ft. in diameter and has a tread 2 ft. wide; it runs on ordinary brass bearings and has no attachments except an emergency brake. The rider mounts his motorcycle while it is on top of the large wheel and his machine is held in place by a cable from the flies until he has attained a speed of 20 or 30 miles an hour. Then he detaches the cable and gradually increases his speed until his speedometer registers 60 miles an hour. The emergency brake has to be applied to stop him.

A Stage Trick in Which the Rider Attains a Speed of 60 Miles an Hour without Moving

ANTISKID RUBBER PLUGS FOR DANCING SHOES

Dancing shoes with nonskid rubber plugs in the soles are one of the strange results of the new eccentric dances. The glassy, slippery dancing soles inherited from former generations are too dangerous for the new steps and many of the dancing pumps seen in the shoe stores today are equipped with safety friction spots. There was a time when slippery soles were needed because dancing floors were rough, but the waxing and polishing of floors nowadays make necessary the use of some kind of a brake on the shoe. Some dancers have tried complete rubber half soles, but they do not slide readily enough. The best combination seems to be a smooth leather sole with a rubber friction spot under the ball of the foot. The friction spot may consist of one square or round piece of rubber or several small plugs, but in either case it is set in a hole cut in the outer sole and cemented to the inner sole.

¶The United States mints made 186,626,871 coins, worth $37,496,530, last year.

GRAIN ELEVATOR DESTROYED BY DUST EXPLOSION

A Close View of the Tangled Wreckage

Elevator as It Appeared after Explosion and Fire

An example of the destructive effect of a grain-dust explosion was given in Buffalo, N. Y., recently, when an explosion with consequent fire destroyed the greater part of one of the largest grain-elevator plants in the country. About 170 men were working in the plant at the time of the explosion, and of these over 30 were killed and a large number injured. The plant occupied an area 500 ft. long and 170 ft. wide, and comprised an elevator with adjacent steel storage bins and a number of concrete grain bins, as well as the usual engine and boiler rooms and service buildings. It is not known just what structures were wrecked by the explosion and which by the fire, but the elevator and all the steel tanks were a total loss. It is thought that the original explosion took place in the elevator and that the fire spread to the adjoining structures. Debris from the explosion was scattered all about the vicinity of the plant, the near-by railroad yards being heavily littered with fragments of concrete. Adjoining the tanks was a loading slip built of structural steel, which was destroyed by the falling debris, and much other damage was done to adjacent property.

MONUMENT TO FIRST COUNTY COURT IN ILLINOIS

A memorial has just been completed at Edwardsville, Ill., to commemorate the hundredth anniversary of the establishment of the first county court in Illinois, which was opened at that point September 14, 1812. This monument, which was designed by Charles J. Mulligan, of Chicago, cost $5,000 and was erected from an appropriation made by the Illinois legislature. It carries four symbolical figures representing, Wisdom, Justice, Virtue, and Plenty.

Monument Commemorates First Illinois County Court, Established in 1812

EGGS HATCHED BY HOT SPRINGS

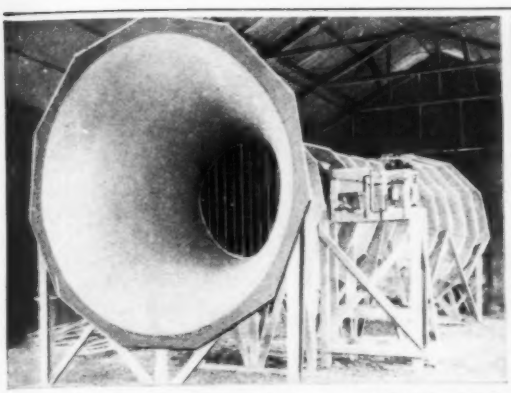
Hot water supplied by nature hatches eggs for a rancher near San Bernardino, Cal. His barn stands near the Arrowhead Hot Springs and the hot-air pipes of his incubator have been connected with the springs to make a natural hot-water heating plant which hatches eggs quite as successfully as the incubator lamp. The possibilities of the scheme were discovered entirely by chance. A brooding hen died about a week before a dozen eggs were ready to hatch, none of the rancher's incubators would work, and the hot springs near the barn seemed to be the only solution. The water in the springs happens to have exactly the proper temperature for hatching eggs, and its temperature never varies.

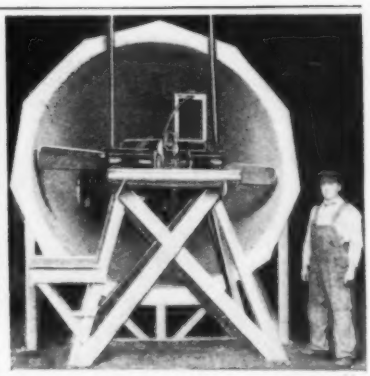
DANGER OF ELECTRIC WIRES NEAR FIRE STREAMS

Whether a fireman is in danger of being electrocuted if he directs a stream of water upon a high-tension electric wire has been the subject of recent tests. While the danger is somewhat dependent upon the size of the stream, it has been found that in general if the wire is over 20 ft. away, the stream of water disintegrates sufficiently to become nonconducting. Since high-tension wires are usually more than 20 ft. from the ground, the fireman should be safe unless he is standing on a ladder or using a tower which would bring the nozzle closer to the wire. The grounding of the nozzle through the water in the hose cannot be depended upon, it has been found, to short-circuit around the person handling the hose.

AEROPLANE TESTING TUNNEL AT CICERO

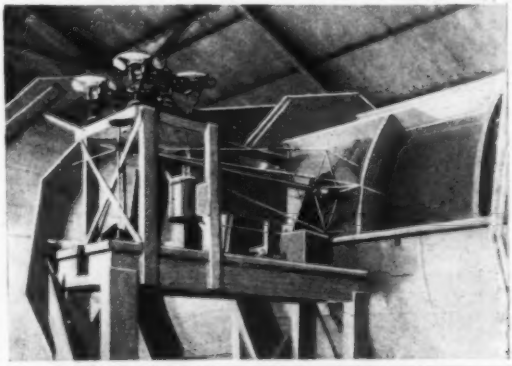
The first American "wind tunnel" for studying the behavior of small models of proposed flying machines has recently been completed at the Cicero aviation field near Chicago. It works upon the theory that the efficiency of an aeroplane can be tested by a study of a model held in a current of air as effectively as by experimenting with the full-sized machine moving in still air. To secure a current of air moving at a known velocity in parallel lines, air is blown through a cylindrical wind tunnel provided with an experimental chamber in which models can be held in the air current. While the Cicero





Entrance to Inlet Nozzle Showing Equalizing Screen

aerodynamic tunnel is in general similar to the apparatus used by Eiffel and other European scientists, previously described in this magazine, it differs chiefly in the construction of the experimental chamber. In the Eiffel tunnel, the testing chamber is a room, 13 ft. wide, let into the tunnel so that the air current passes across it; all the measuring instruments are in this room. In the Cicero apparatus no testing room is let in, but the model is hung directly in the tunnel, watched through a glass window in the side and handled from a trapdoor below, with all the instruments outside the tunnel. This arrangement tends to eliminate eddies about the model more completely, and results in smaller apparatus. The inlet nozzle of the Cicero tunnel is 6 ft. long and tapers from 8 ft. to 4 ft. in diameter; the outlet nozzle is 18 ft. long and flares from 4 ft. to 8 ft. The testing chamber is a 4-ft. section of the tunnel, 4 ft. in diameter, between the inlet and outlet nozzles. A 25-hp. gasoline engine driving a 7-ft. 9-in. propeller up to 1,000 revolutions per minute supplies a current of air varying from 30 to 70 miles an hour. The Eiffel apparatus at Auteuil is much larger and requires a 50-hp. motor to supply a current from 4.5 to 72 miles an hour.

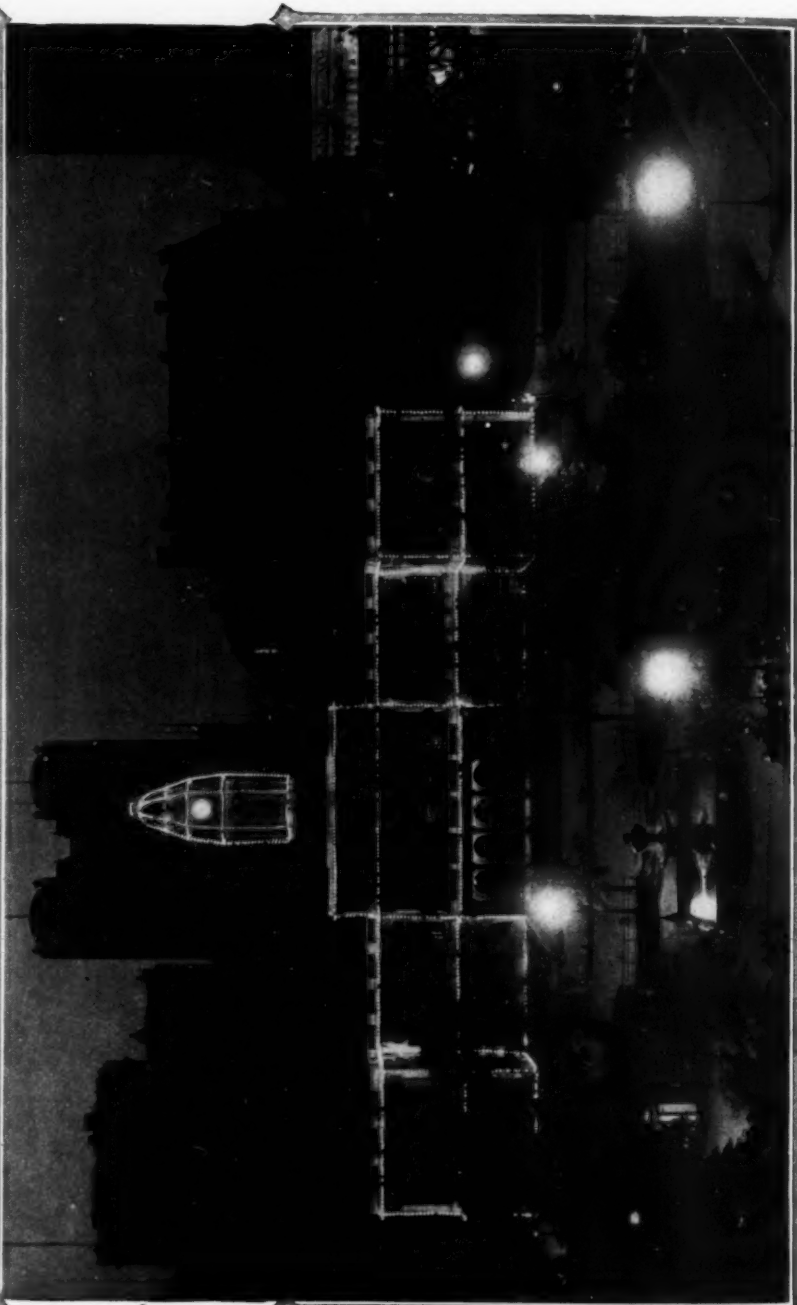


Above: Outlet Nozzle, and Propeller for Producing Air Current

Below: A Section of the 28-Ft. Tunnel with Some of the Measuring Instruments beside the Testing Chamber

DESTROYING BACTERIA IN PUBLIC BATHS

Electrolyzed sea water, poured into swimming pools in small quantities, has proved to be an effective sterilizer to be used in the fight against noxious bacteria. Its sterilizing action is so great, as experiment has shown, that 30 gal. will keep the water in an 85,000-gal. tank clear and free from bacterial organisms for several days. And the electrolyzed sea water costs only about $10 per 1,000 gal. The need of such a sterilizer is shown by the fact that in a fresh-water pond of 100,000 gal., used by 380 bathers, the bacteria have been known to increase from 500 to 342,000 per cubic centimeter (about $\frac{1}{16}$ cu. in.) in one day.



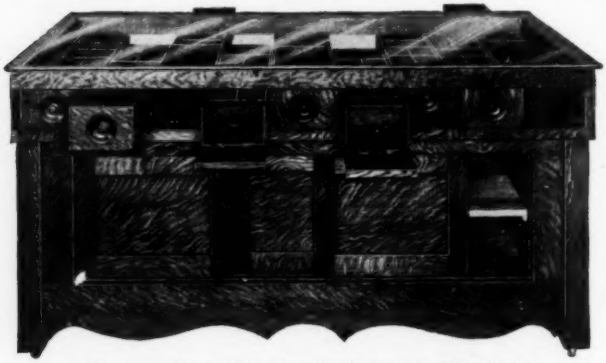
The Old City Hall of New York City in Gala Attire: Strings of Electric Bulbs, Pencling Every Line of the Building and Framing the Old Clock Tower, Make a Striking Architectural Picture against the Black Sky and the Dark Buildings about It, and Light Up the Little City Hall Park for Public Gatherings

IN THE DECORATION OF A CITY FOR GALA OCCASIONS

The Beautiful Effect Produced by Clusters and Strings of Electric Lights on Washington Arch, Which Guards the Fifth Avenue Entrance of Washington Square, New York City: Every Line of Light to the Top of the Entablature, Over 65 Ft. in the Air, Stands Out Clear-Cut in the Darkness

HARDWARE-STOCK CASE WITH GLASS TOP

A glass-covered showcase for storing and exhibiting small hardware has been patented and is being manufactured. It was designed to avoid the showing of tarnished samples and to systematize the storing of slow-selling stock. The principal feature, as the illustration shows, is a series of small stock drawers divided into little compartments, all under a sheet of plate glass, under the customer's hand. A card-index system is also provided with this case.



Hardware Case for Storing Small Stock in Plain Sight

DRY BOX FOR PRESERVING TENNIS BALLS

Tennis balls can be preserved in usable shape for an indefinite length of time if they are kept absolutely dry. They lose their resiliency and become "dead" before they are worn out, because dampness decomposes the rubber. An air-tight box containing a substance that will absorb moisture and prevent decomposition has recently been patented, as well as a similar air-tight case for protecting tennis rackets from moisture.

¶A moving-picture camera and a microscope will be used at Sheffield, Eng., to show the crystalline changes that take place during the pulling of a piece of metal.

GERMANY BUILDING AFRICAN RAILROADS

Germany is extensively pushing railroad construction in its African colonies. The Usambara Railroad, now at New Moschi, 196 miles inland, is to be extended to Mambo, German East Africa, and will finally terminate at Lake Victoria. A railroad is also being built from Duala, on the Kamerun coast, to Bidjoka, 95 miles. Almost as soon as Germany received a portion of the French Congo as a result of the Morocco incident, she considered the advisability of extending the line on the west coast to the Congo at the mouth of the Sanga, and it is reported that either a railroad or automobile route will be built between Bukoba, on Lake Victoria, and Missenge, on Lake Kivu.

ALL-GLASS AUTOMOBILE LAMPS

No polishing is required by the all-glass automobile lamps which recently appeared on the market. The body of the lamp, which is of the bullet type, is made entirely of glass and is finished on the inside to match the car. A vacuum between the outside wall and the parabolic reflector preserves the finish and keeps the outside of the lamp from being heated by the electric bulb. As the color or metal finish is on the inside, protected from the air, a rub with a cloth is all that is necessary to clean the lamp. The glass is of course heavy enough so that the lamps are not easily broken.

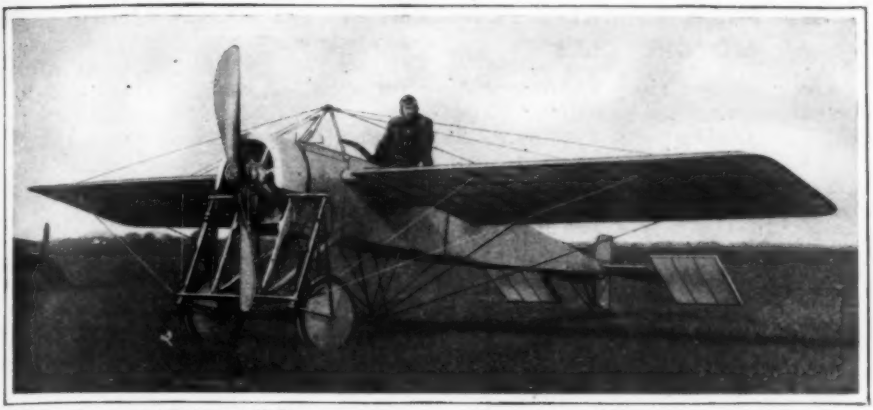


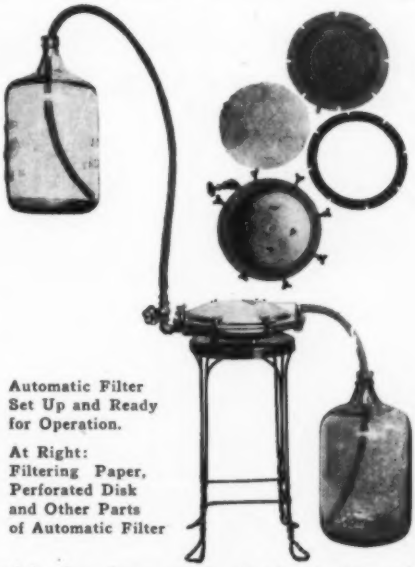
Photo by Underwood & Underwood, N. Y.
Airman C. M. Wood and Moisant Monoplane, "Blue Bird," in Which He Beat a Train from New York to Washington and Broke the American Nonstop Record

NEW NONSTOP AEROPLANE RECORD

The American nonstop aeroplane record was broken on August 9 by C. Murvin Wood, who flew from Hempstead, Long Island, to Gaithersburg, Md., 287 miles, in 265 minutes. The previous record was held by Lieut. Thomas DeW. Milling of the United States army, who flew 224 miles in 262 minutes without stopping. Wood attempted to race a railway train from New York to Washington, but fog, engine trouble, and city smoke forced him to land a few miles from Washington. He beat the train, however, and laid claim to the duration cross-country record and the speed record up to 287 miles. The train left Jersey City at 4:30 and reached Washington at 9:50. With a handicap of 6 minutes and 30 miles, Wood left Hempstead at 4:36 and landed at Gaithersburg at 9:01, 40 minutes ahead of the train.

APPARATUS FOR FILTERING VALUABLE LIQUIDS

An automatic siphon filter designed for filtering flavoring extracts, perfumes and pharmaceutical preparations has recently been brought out. With this device the entire operation is carried out in an air-tight vessel, thus avoiding all loss through evaporation. The siphon is started by exhausting the air from the filtering vessel, and the filter works under a little more than atmospheric pressure by placing it several feet below the container of the unfiltered liquid. The filtering material used is paper of special composition. With the idea of providing a large capacity without interfering with the close work obtained through the use of paper, a filtering surface of 131 sq. in. is used.

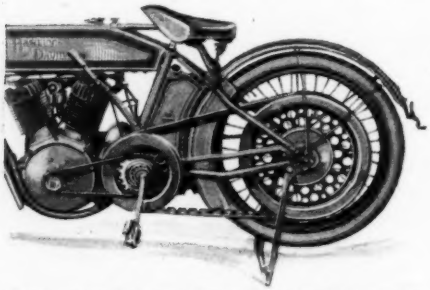


Automatic Filter Set Up and Ready for Operation.

At Right: Filtering Paper, Perforated Disk and Other Parts of Automatic Filter

NEW FORM OF DRIVE FOR MOTORCYCLES

A combination chain and belt drive for motorcycles has been brought out which overcomes the objections to the



Combination Belt and Chain Drive for Motorcycles

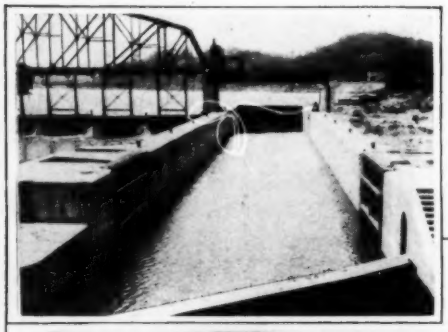
ordinary belt drive and at the same time eliminates most of the road shocks which are transmitted to the motor when a direct chain drive is used. The motor is connected to the crankshaft by means of a chain drive, and from this crankshaft the wheel is driven by a V-belt. Flexibility and noiselessness are two of the advantages of this type of drive, together with a minimum of wear and tear on the frame and power plant, due to the automatic "give" when an overload is suddenly applied. There is also a large degree of flexibility both longitudinally and laterally.

AUTOMOBILE TIRE MADE OF HORSEHAIR

Patents for an automobile tire to be made of compressed horsehair have been taken out by a French inventor. The horsehair is made into sheets or bands and wound around a core, which may be of either solid or hollow metal, the whole being covered with canvas. The purpose of this invention is to provide resiliency without the use of a rubber air tube.

MOVABLE DAM WHICH HAS 247-FT. SPANS

A movable dam with spans of unusual length is one of the features of the New York State barge canal between Buffalo and Albany. Each span is 247 ft. long and has gates operated by steam, while the lock used in connection with this dam is 60 ft. wide and 345 ft. long with gates operated by electric power.



Above: View Showing Lock and Connection with Dam; Below: Movable Dam Viewed from the Downstream Side

The Wreck of a German Airship Which Uprooted Several Large Birch Trees to Which It was Anchored during a Storm

ANOTHER GERMAN AIRSHIP WRECKED

Another dirigible wreck was added to Germany's long list of airship accidents late in the summer. The military dirigible, "Schütte-Lanz," was almost totally demolished by a storm during a flight from Königsberg to Berlin. After landing at the village of Schneidemühl, the airship was anchored to several large birch trees and left pilotless to ride out the storm. When the wind became too strong, the dirigible uprooted the trees, tore loose from its moorings, and finally fell in a crumpled mass in a small grove near by. The "Schütte-Lanz" was of the military dirigible type and had a complete framework of aluminum. The wreck crumpled and buckled the frame in several places and tore loose a large part of the outer covering. Some idea of the strength of the wind pressure can be gained from the size of the birch roots that were torn from the ground.

One of the Birch Roots That was Torn from the Ground

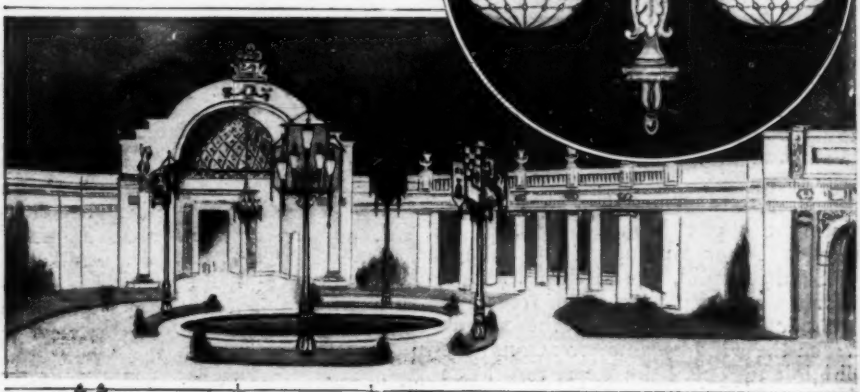
PICNIC LUNCH TABLES MADE OF CONCRETE

Concrete tables and benches are provided for picnickers in some of the parks in Washington, D. C. They are gradually replacing the old wooden tables and benches because they are better able to stand the wear and tear of weather and hard usage. The simplicity and massiveness of the imitation stone makes these necessary conveniences ornamental as well as useful. Five of them have been set up in the National Zoölogical Grounds and a few of them have replaced the wooden tables in Rock Creek National Park.

Concrete Table and Benches for Picnics in Washington Parks

ARTIFICIAL DAYLIGHT FOR WORLD'S FAIR

The illumination of the Panama-Pacific International Exposition in 1915 will demonstrate the most modern system of lighting by indirect light. Artificial daylight, produced by diffused and reflected electric light, will bathe the entire grounds in a flood of uniform light extending to a height of 125 ft. above the ground. Although almost four billion candlepower will be used, there will be no glare or unprotected light to tire the eyes. Previous expositions have been illuminated by uncovered arcs, searchlights, and outline strings of electric bulbs on the exterior of the buildings. The result has been much glare and a great distortion of architectural and sculptural effects at night because of dark spaces and shadows. There will be no outlining at the Panama-Pacific Exposition, and its elaborate scheme of lighting will illuminate the buildings almost as naturally and with as little distortion as daylight. Much of the effect produced would have been impossible five or six years ago. Even now, indirect lighting is receiving further development in the exposition through the use of cut-glass prisms, or "jewels," to reflect and diffuse the glow.



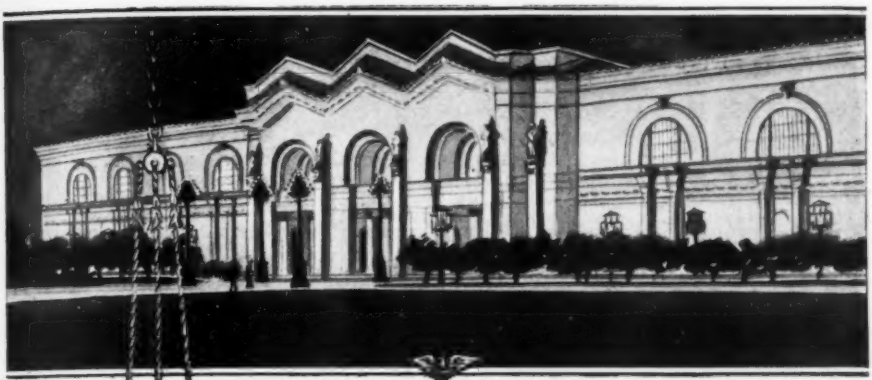
Upper View: Interior Chandelier with Shaded Globes

Lower View: Indirect Lighting in the Court of the Four Seasons

Copyrighted by Panama-Pacific Exposition

Arc Standards, 55 Ft. High, Shaded by Banners Which Reflect Light against the Outside Walls of the Buildings

Five principal sources of light will be used. The exteriors of the buildings will be illuminated by thousands of luminous arc standards, like huge lamp-posts, in front of the buildings.



Facade of Machinery Hall Illuminated by Luminous-Arc Standards

Photos Copyrighted by Panama-Pacific Exposition

The Tower of Jewels Illuminated by Thousands of Glass Prisms Diffusing the Light from Powerful Searchlights

On top of each standard, 55 ft. above the ground, great clusters of electric arcs will send out 8,000 to 10,000 cp. Canvas banners, white on the inside and elaborately painted on the outside, will shield the arcs and reflect their light upon the buildings' facades, bringing out every architectural detail clearly and uniformly. In the center of the courts, large fountains of dense white glass, with waterfalls near their bases, will shed a soft, even, diffused white glow over water and grounds. Two of these fountains, with glass columns 70 ft. high, and arcs developing 50,000,000 cp., will stand in the Court of the Sun and Stars. To light the walls behind colonnades and overcome the shadows cast by other lights outside, shaded arcs will be concealed in niches on the backs of the columns. Their subdued and reflected light will set off the costly paintings on the walls without shadows or distortion; when shadows are desired they will be produced with soft purplish light. Nor will there be any glare inside the exhibit palaces and other buildings. The larger spaces will be flooded with soft white light from arcs concealed in chandeliers, 12 ft. in diameter; smaller spaces will be provided with less powerful "basin" lamps which shed their light on the ceiling. Rows of starlike glass prisms around the huge lantern chandeliers will catch light coming from all directions and spread it uniformly into every corner.

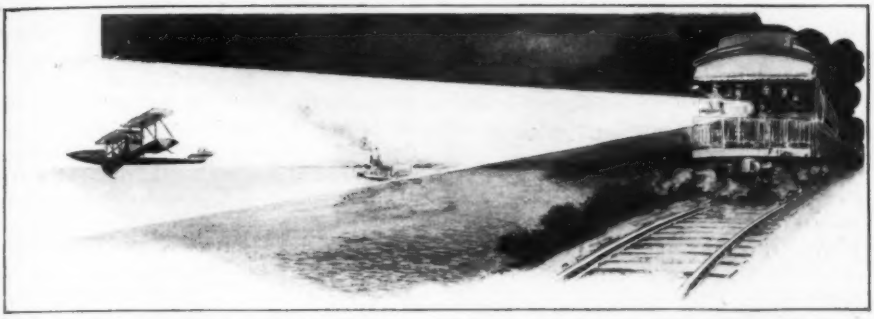
These are the individual lighting units. To weld their rays together and create a solid zone of daylight, masked batteries of powerful searchlights on roofs of exhibit palaces will direct their light upon thousands of quivering glass prisms hung about the buildings. The searchlights will be invisible and their rays will pass unseen through the general zone of light, but the glass "jewels" will reflect their light in all directions and in many sparkling colors. The 430-ft. Tower of Jewels in the Court of the Sun and Stars will be hung with 50,000 glass jewels, quivering and swinging in the wind. About the court a row of hovering female figures, 14 ft. high and bearing 4-ft. stars of glass prisms, will add to the brilliance. On a pontoon out in the harbor a masked battery of thirty-six 24-in. searchlights will play upon the whole scene, throwing various colors to produce auroras in the sky. The resulting zone of daylight will be visible 40 or 50 miles at night.

SHIPPING PACKAGE FOR CHOICE APPLES

As a result of the difficulty encountered in shipping select apples without bruising, a patent apple-packing box has appeared on the market. It is a heavy-cardboard package, sealed with gummed tape and containing 12 small boxes of the same material for apples. Each small box is just large enough to hold 12 apples, has the name of the grower and the variety of the fruit printed on the cover, and is decorated with paper lace for counter display. In this way, 144 apples can be shipped in a neat package with little risk of damage.

Compartment Pasteboard Box for Shipping Select Apples without Bruising

¶In its war on the housefly, an Alabama town gave a ticket to a moving-picture show to every child who presented 50 or more dead flies. Hundreds of thousands of flies were killed by the children, and the show was crowded to the doors.

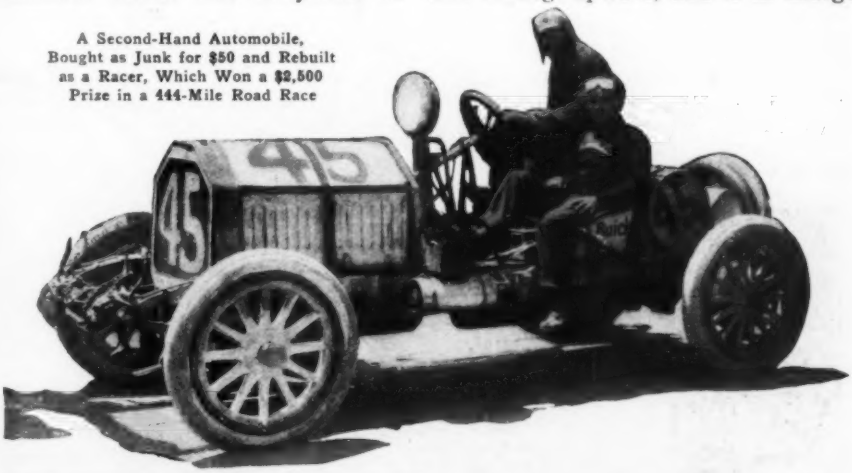


Scenery Illuminated after Nightfall by Searchlight on Observation Platform of Fast Train

RACER THAT COST $50 WON SECOND PLACE

Second place and a prize of $2,500 in the recent 444-mile road race from Los Angeles to Sacramento, Cal., were won by a second-hand automobile which was bought as junk for $50 and rebuilt as a racer. The car was a 1910 model which had seen hard service as an auto stage in the desert. After an accident it had been sold as junk. A young mechanic bought it for $50, remodeled it and entered it in the race against 48 powerful racers. The rehabilitated wreck was forty-fifth to start and tenth to reach Sacramento, although third in elapsed time—12:30:25. The hardest part of the course was covered at night.

A Second-Hand Automobile, Bought as Junk for $50 and Rebuilt as a Racer, Which Won a $2,500 Prize in a 444-Mile Road Race

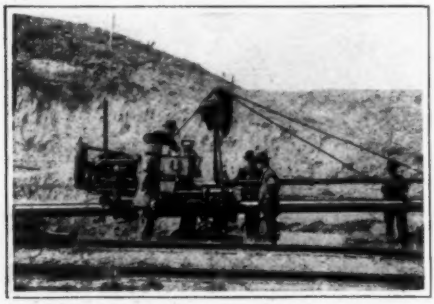


RAILWAY FURNISHES NIGHT VIEWS WITH SEARCHLIGHT

A new feature that gives promise of becoming popular with the traveling public has been installed on the through passenger service of a railway that parallels the upper Mississippi River for a considerable distance. This consists of a marine searchlight of 3,000,000 cp. which is mounted on the observation platform and which is capable of illuminating objects clearly at a distance of three miles. The light can be swayed 90 deg. from right to left and 45 deg. upward, and is in charge of an experienced operator. The river boats, strange rock formations and buttelike bluffs furnish an interesting panorama on which the light is played.

MACHINE FOR BUILDING PIPE LINES

What is probably the only machine ever invented for putting together a pipe line with a minimum of hand labor

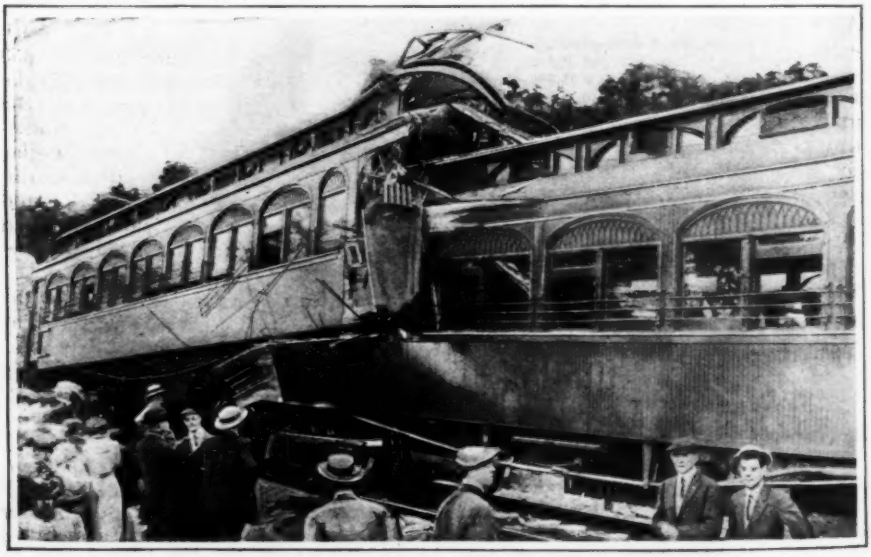


Machine for Laying a Pipe Line without Hand Labor

is shown in the accompanying picture. It was used in laying a pipe line to carry oil from the Midway fields to the harbor at San Pedro, Cal. The machine, driven by gasoline power, travels along the pipe under its own power. At each junction a cranelike arm, projecting forward from the machine, holds up the next section of pipe while a clutch at the forward end screws the pipe into place. During the joining process the machine is raised in the air on a pair of cogged legs. For making a curve, the machine is raised high on its legs, a wooden horse is placed under the pipe, and the machine is lowered until the pipe has been bent sufficiently.

TROLLEY WRECK WITHOUT FATALITIES

Two electric interurban cars, a limited and a local, on the Syracuse, Lake Shore and Northern Railroad, collided and telescoped on Aug. 6, near Oswego, N. Y., without killing or fatally injuring a single person. One car passed almost halfway through the other, raising its roof nearly as high as the trolley wires. The remarkable strength of the cars is shown by the fact that although the shock was sufficient to tear loose iron window guards, the car frames held together and not even the windows nearest the shattered portions of the cars were broken. There were 50 passengers on board the cars, and 25 were injured.



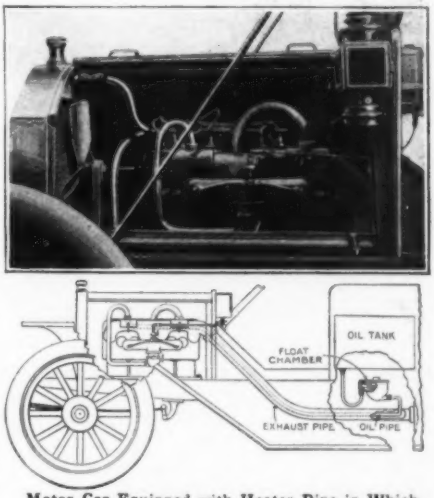
Trolley Wreck in Which the Cars Withstood the Shock So Well That None of the 50 Passengers was Killed

KEROSENE AS MOTOR FUEL PROVES SUCCESSFUL

Remarkable results have recently been obtained from kerosene carburetors, or vaporizers, according to authentic reports of tests. Some of these reports indicate that properly vaporized kerosene may be more efficient as a fuel than gasoline when the latter fluid is vaporized by the usual methods. The reason for this is that in order to be used at all in an internal-combustion engine, kerosene must be vaporized in a very thorough manner, it being necessary to apply a considerable quantity of heat in the process. Gasoline, on the contrary, vaporizes readily without the application of heat, the ordinary process consisting simply of spraying the oil into a current of air, with which it mixes in the form of a vapor. Since the fuel value of the two oils is about the same it seems probable that the necessary thoroughness of the vaporization of kerosene may make it, as indicated, a more efficient automobile fuel. In addition to this, less lubrication may be required with kerosene on account of the lubricating qualities of the kerosene itself.

A high degree of efficiency was shown by the kerosene carburetor used on one of the cars in the recent Indiana-Pacific tour. This car carried three passengers in addition to the driver, the total weight, including load, being 4,390 lb., and the distance traveled 4,015 miles. From start to finish there was used 250 gal. of kerosene, 8 gal. of gasoline for starting, and 6 gal. of lubricating oil, the total cost for fuel being $31.76, and for lubricating oil $2.40. The cost of fuel was .79 cents per mile, or .36 cent per ton-mile. Ignition was by means of magneto and plugs. It is stated that the spark plugs were not cleaned on the entire trip, and that no adjustment was made on the carburetor other than that made from the steering-column control.

Tests have also been made of a carburetor designed to take any liquid containing power-producing elements and form it into a vapor suitable for firing in the cylinder of an automobile engine. These tests, which were made with a 6-cyl. motor linked to an electrical dynamometer from which horsepower readings were obtained, furnish an interesting comparison of the fuel

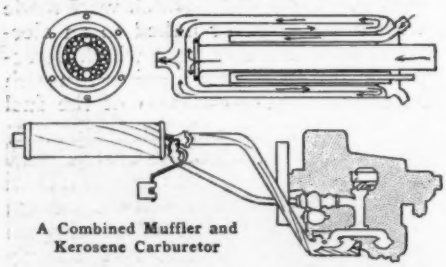


Motor Car Equipped with Heater Pipe in Which Kerosene is Boiled into a Gas by Heat from Engine Exhaust

values of gasoline and kerosene. With the motor running on gasoline at 1,653 revolutions per minute, 56.4 brake horsepower was developed and the amount of gasoline used per horsepower-hour was .98 lb. In a similar test with kerosene the motor was run at 1,692 revolutions per minute, and 70.8 brake horsepower was developed with a consumption of .805 lb. of fuel per horsepower-hour.

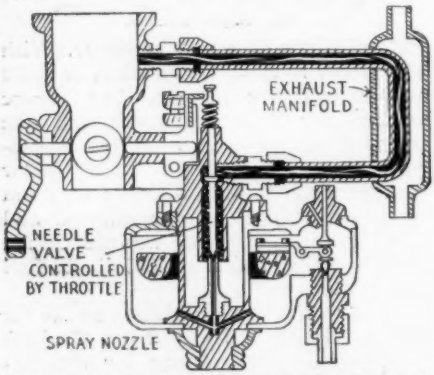
All the kerosene carburetors so far subjected to practical test use the heat from the engine exhaust for vaporizing the fluid, and in all but one it is necessary to start on gasoline, which is switched off as soon as the carburetor and cylinders are thoroughly heated. The one that does not use gasoline for starting supplies the necessary preliminary heat by means of an electric current. In one device the oil, with proper regulating devices, flows from the tank into a ⅜-

in. heater pipe placed in the center of the engine exhaust pipe, and is drawn through the heater pipe by the suction



A Combined Muffler and Kerosene Carburetor

of the engine to the exhaust manifold, where the exhaust heat boils it into a vapor. This vapor passes into the mixing tube where it is mixed with air, and is then fired in the cylinder in the usual way, the proper mixture of kerosene and air being controlled by the throttle. In a recent test, a motor car equipped with this device was driven 110½ miles on 5 gal. of kerosene. Another form of carburetor consists of an ordinary muffler with vaporizing attachments. The space around the central pipe is filled with gray-iron slugs, which become heated by the ex-



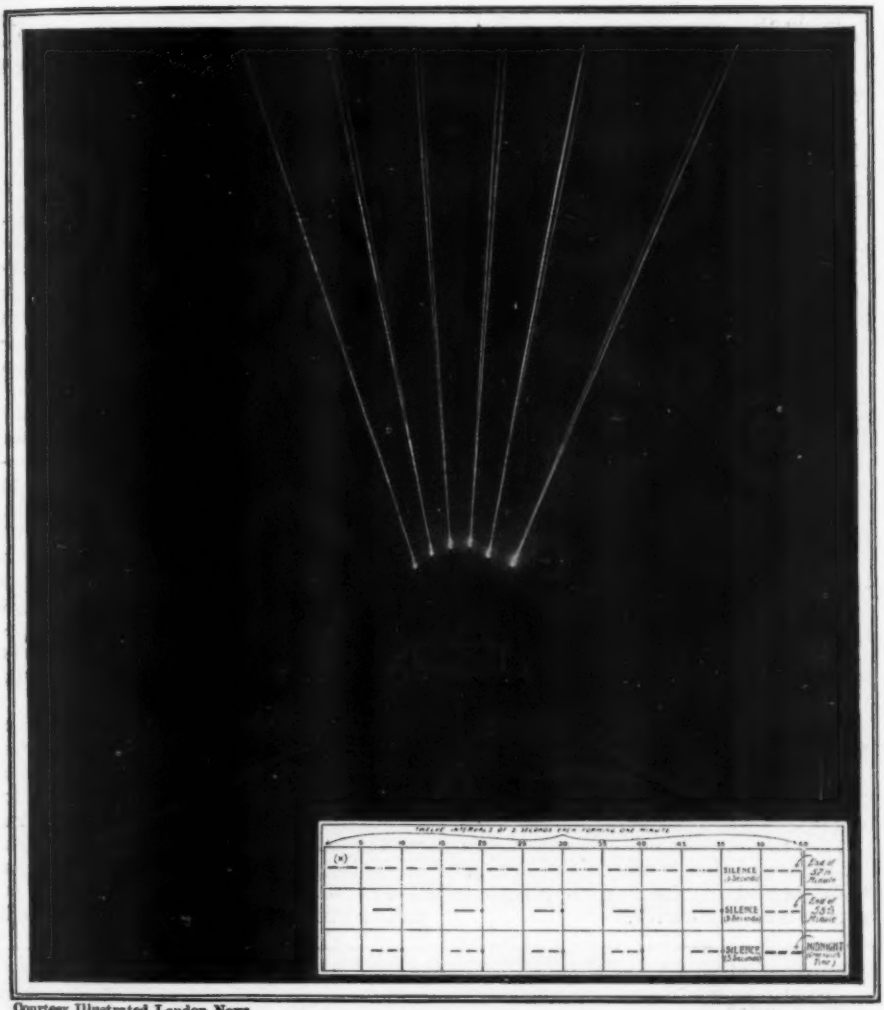
Carburetor in Which the Kerosene is First Sprayed and Then Formed into True Vapor by Heat from the Exhaust Manifold. Black Line Shows Path of the Kerosene

haust as it passes through the muffler. In the upper part of this slug-filled space is the oil pipe, which is perforated with $\frac{1}{16}$-in. holes. The oil simply drips through these holes on the hot slugs and is vaporized. The vapor is drawn through a pipe by the suction of the engine to a mixing valve, after which it is fired in the cylinders. The vapor has a temperature of from 550 to 750 deg. F. as it leaves the carburetor, which is reduced to about 122 deg. F. by the addition of air in the mixing valve. The motor is started with gasoline, but the construction of the carburetor is such that it will maintain a vaporizing temperature for about two hours after the motor is stopped.

One kerosene carburetor that is meeting with success first atomizes the liquid and then converts it into a true vapor. This device is provided with an annular float chamber of the ordinary type and a needle valve which controls the spray nozzle. A small quantity of air is admitted to the air chamber and mixes with the atomized kerosene, the mixture then entering the gas-producing tube. This tube passes through the exhaust manifold where the mixture of air and atomized kerosene is converted into a true vapor, the mixture then passing through the mixing valve. In this device the needle valve which governs the admission of kerosene is controlled by the throttle valve. In order to permit starting on kerosene an electrical current is applied to the gas-producing tube to furnish the requisite heat until the exhaust takes up the work.

STANDARD TIME ANNOUNCED BY WIRELESS

Greenwich time is flashed to the world now, several times each day, from the powerful wireless station on the Eiffel Tower, Paris, in an international code of signals that can be picked up by operators anywhere within a radius of 2,000 or 3,000 miles. Far out at sea, ships' officers catch the time message and correct their chronometers, and many watchmakers have receiving stations to intercept the time messages. In London, Berlin, St. Petersburg, and Rome amateurs set the family clocks from the dots and dashes caught by their receivers. No correction has to be made for time con-



Courtesy Illustrated London News

Photograph, Taken Vertically Up the Side of the Eiffel Tower, Showing the Glow of the Antenna Wires While Greenwich Time is Being Flashed to the World on a Dark Night. Sketch Shows the Midnight Call of the New International Wireless Code Used to Announce Greenwich Time from Eiffel Tower, Paris

sumed in the passage of the message, for the wireless waves travel at a speed of 186,330 miles a second, and at a distance of 3,000 miles the pressure of the sender's key and the response of the receiver's telephone are simultaneous. The principal time messages are sent at 10 a. m., 11:30 p. m., 11:45 p. m., and midnight. Beginning at 11:30 every night, a "tap" per second is sent for three minutes until the 180th tap marks 11:33. A more complete message is sent at 11:44—49, followed by a weather report. Beginning at 11:57, the international midnight signal is sent. Three separate calls, each lasting a minute, as indicated in the accompanying diagram, prepare receiving operators for the final 74th dash which marks midnight at Greenwich. The Eiffel Tower apparatus is so powerful that the electrical tension often reaches

millions of volts. On dark nights the wires of its antenna become luminous and look like lines of fire against the black sky while the time messages are being sent. Even when they cannot be seen by the naked eye, their ultra-violet rays can be caught and recorded on a photographic plate.

HOUSES THAT ARE BUILT IN A DAY

Building monolithic concrete houses in one day is becoming a common thing, but Hamilton, Ontario, boasts of a large brick house that was built completely in 24 hours. It is 2½ stories high and cost $6,000. The construction of the house began at 5 p. m. on August 12, and by 5 p. m., August 13, the house was ready for occupancy. The force of men who accomplished the feat consisted of 25 carpenters, 40 bricklayers, 10 steamfitters, 4 glaziers, 8 electricians, 64 laborers, 2 tinsmiths, and a number of plasterers and painters. This record is often beaten in Porto Rico where many families insist upon having a new home once a year and set aside an hour or so at the end of each summer to gather material and construct a new winter residence. Four men can build a Porto Rican bark house in about 50 minutes, spending half the time to gather the material. Its four corner posts are cut from the trunk of a fallen coco palm, a light frame of saplings is built about them, and the whole structure is covered with flat pieces of the dried bark of a royal palm, bound together with strips of banana and coco fiber.

CONVENT SISTERS MANAGE COAL MINE

A coal mine with a productive capacity of 60 tons a day, sufficient to supply heat, light and power for one of the largest convent schools in the country, has been successfully managed for years by the Sisters of Providence, the Catholic order that conducts the institution known as "St. Mary of the Woods," near Terre Haute, Ind. The convent was founded in 1840, but it was not until 1894 that the discovery of valuable coal deposits, underlying the lands belonging to the institution, was made. A shaft was first sunk to a depth of 97 ft., but this was later abandoned for a shaft 270 ft. deep, where the average thickness of the coal vein is 5 ft. This mine is now operated under the management of one of the sisters, who is well versed in everything pertaining to mining operations and machinery.

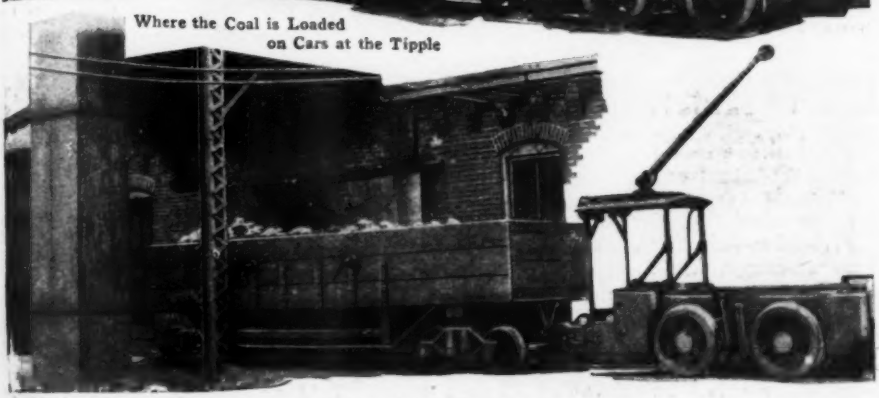
The equipment is of modern type throughout. For hauling the coal from the mine to the power house, a distance of three-eighths of a mile, an electric motor-trolley system is used. The power house has five dynamos which furnish electric current for the buildings and grounds, while the exhaust heat is utilized for heating. Water is supplied

This $6,000 Brick Residence was Built Completely in 24 Hours

It Took 50 Minutes to Build This Porto Rican Bark House

Girl Students Riding on the Electric Locomotive That Hauls Coal from the Convent-Owned Mine. On the Right, a View of the Mine

Where the Coal is Loaded on Cars at the Tipple



Delivering Coal at the Convent Power House

from a reservoir by a pump driven by two motor generators, and is stored in a 100,000-gal. water tower about a mile distant from the institution, from which it passes through three gravel filters before being used. A duplex fire pump is located at the power house and has a capacity of 1,000 gal. per minute. A total of 44 motors are required about the buildings and grounds for various power purposes, which include an ice machine with a daily capacity of 16,000 lb., an electric laundry, and automatic electric elevators in four of the buildings.

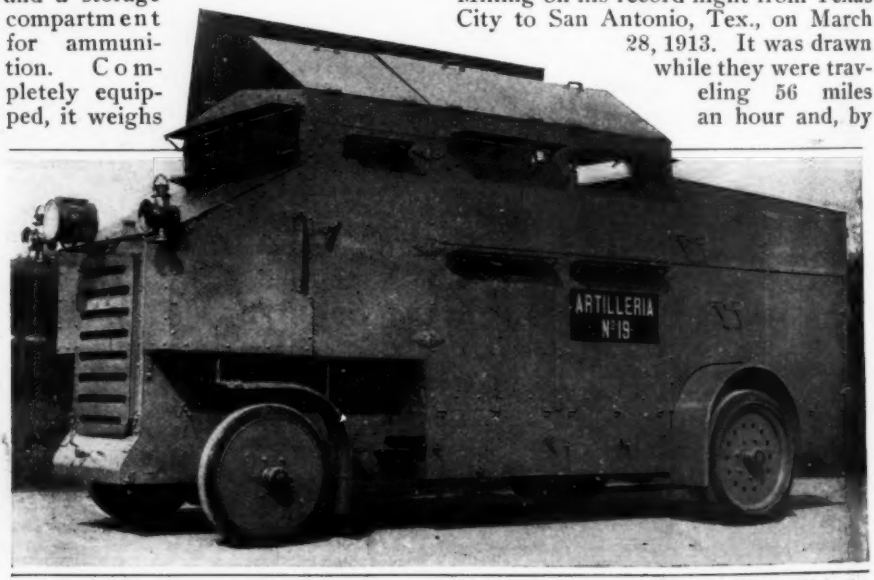
THE SPANISH ARMORED AUTOMOBILE

The Spanish army has a huge armored automobile which has seen real fighting in the recent African campaign and proved very effective. The entire car, machinery and all, is completely covered with armor plate, heavy enough to turn a rifle bullet. Inside it is divided into three compartments: a cab for the driver, a "blockhouse" for a force of sharpshooters, and a storage compartment for ammunition. Completely equipped, it weighs 9.35 tons and is driven by a 40-hp. gasoline motor with the usual systems of gearing, ignition, lubrication and control. The roof and portholes, when open, are shielded and the interior is practically inaccessible, even if the armored car is overwhelmed by a hostile force.

WAR MAPS MADE DURING AEROPLANE FLIGHTS

The practicability of making war maps from aeroplanes during aerial scouting expeditions into the enemy's territory has recently been tested by the signal corps of the United States army and found entirely feasible. Several signal officers flying alone or as passengers were able to make usable sketch maps of the country below them, as they flew two or three thousand feet in the air.

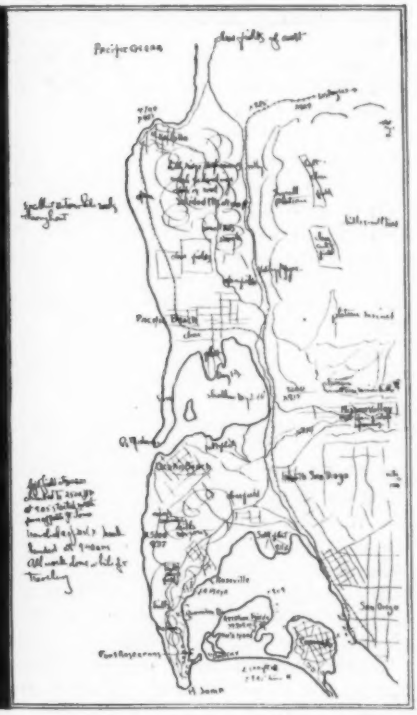
Two maps that were made during these tests are reproduced on the opposite page. One of them is the rough sketch map drawn by Lieut. W. C. Sherman while riding as a passenger in an aeroplane with Lieut. Thomas DeWitt Milling on his record flight from Texas City to San Antonio, Tex., on March 28, 1913. It was drawn while they were traveling 56 miles an hour and, by



Courtesy Motor Age

Powerful Armored Automobile Used by Spain in the Recent African Campaign

Rough Sketch Drawn by an Officer during a Flight from Texas City to San Antonio



Copy of Sketch Map of San Diego, Cal., and Vicinity Made by Army Pilot Flying Alone

means of the signal-corps symbols, gives a clear picture of the country over which they passed. Railroads, highways, streams, towns, woods, etc., are marked, and the figures on the left-hand margin indicate the aeroplane's time. The original sketch is 12 ft. long and to scale, 6½ in. equaling 10 minutes, and 1 in. equaling 1.44 mile. The other is a completed map drawn from a sketch of San Diego, Cal., and vicinity made by Lieut. J. D. Park while flying alone on May 3, 1913, a few days before his death in an aeroplane accident on May 9. The coast line and the topography of the country are indicated clearly enough to be of value to an attacking force, and at various points clear fields where airmen might make safe landings are marked out. Although the strip of country included in the map is 5 miles wide and 15 miles long, the entire sketch was made during a 35-minute flight from the aviation field at the south along the line of the railroad. At times the airman reached a height of over 3,000 ft. and from there was able to note the character of the country for 10 miles about.

The army signal corps now has 15 aeroplanes and an aviation detachment of 75 officers, of whom 23 are trained pilots. Two flying machines and five pilots are stationed in the Philippine Islands; two machines and one airman in Hawaii; nine machines and 17 officers, six of whom are pilots, at San Diego, Cal.; two machines and two airmen at Texas City. Seven aeroplanes are now being built for delivery on Oct. 31, 1913. Army airmen are trained at a school of aviation at College Park, Maryland, established two years ago. All officers in the signal corps study map drawing as a part of their regular training.

COLUMBUS' CARAVELS ON LONG JOURNEY

The "Santa Maria," the "Pinta," and the "Nina," the three little ships which Spain built to reproduce the caravels of Christopher Columbus and gave to the United States for the World's Columbian Exposition in 1893, are to journey to the Panama-Pacific Exposition at San Francisco, by way of the Panama Canal. They have been repaired and repainted and the "Pinta" has a new keel and stern. The "Santa Maria," carrying what is said to be Columbus' own anchor, sails at the head of the fleet under the command of a Harvard rowing coach, and 60 men, 28 less than Columbus had, man the squadron. False decking, copper sheathing and temporary crew quarters between the decks have been installed for the trip under the direction of a navy master-at-arms who crossed the Atlantic in the caravels in 1892. A bond of $10,000 has been given to Chicago to secure their safe return at the close of the San Francisco fair.

Their journey will take them many thousands of miles and will last over a year. Their route lies through the Great Lakes and Erie Canal to New York; thence, after a trip to Boston, down the Atlantic coast. Stops will be made at many cities for public exhibitions, and plans have been made to give short trips on the caravels to students interested in ancient ship building and navigation. Part of the way, especially in the Erie Canal and on the Atlantic, they will be towed by tugs. After a visit to San Salvador, Columbus' first landing place in America, they will pass through the new Panama Canal and then proceed under their own sail up the Pacific to San Francisco for exhibition at the Panama-Pacific Exposition in 1915.

The three caravels were built in Spain in 1892, and are very close reproductions. The "Santa Maria" is an exact replica, because Spain has on file the specifications of Columbus' flagship, recorded at the time of her sale shortly after Columbus' trip to America. The "Pinta" and the "Nina" are not such exact copies, but were built by an American navy officer in imitation of Portuguese merchant ships of the 15th century. In the summer of 1892, 400 years after Columbus' voyage of discovery, the little squadron was towed across the Atlantic by Spanish and American battleships. The crossing was a thrilling one for the men who manned the caravels, but it was made in 20 days, one-third of the time spent by Columbus in sailing across. Since the exposition of 1893 they have lain at anchor in the yacht harbor at Jackson Park, Chicago, within a short distance of the reproduction of the Convento de la Rabida. When they were placed in a motorboat dry dock this summer their only signs of age were a humped keel and a weakened stern on the "Pinta."

The caravels are very small in comparison with modern ocean ships or even with sailing vessels of a century ago. The largest of them, the "Santa Maria," is a vessel of only 127 tons. She is 84 ft. long over all, and 77.9 ft. on the water line. Her beam is 26 ft. and she draws 9 ft. of water. Amidships her hold is 12 ft deep. The overhang of the bow is 11 ft. and of the stern, 5 ft. In all she carries about 5,980 sq. ft. of canvas. The "Pinta," the larger of the other two caravels, is a vessel of only 50 tons. The little "Nina" is the fastest sailer of the three. The complete armament of the "Santa Maria" consists of two bombards and six falconets throwing 2-lb. balls. On the decks and in the cabin there are racks for swords, armor, crossbows, battleaxes, and other small arms. Cooking is the most difficult part of a voyage on the caravels. The arrangements to be used in the present trip are designed in imitation of Columbus' equipment, consisting of iron-lined boxes of earth for charcoal fires, lashed to the mainmasts.

¶This year's plantation output of rubber was 50,000 tons, exclusive of Brazil's output of native rubber.

The Flagship "Santa Maria" Sailing Under a Full Rig of Brown Denim Sails

At Left: The "Nina," the Smallest and Fastest of the Three

At Right: The "Pinta" being Repaired

AN ENGINE SMALLER THAN A FLY

Another "smallest engine in the world" is shown in these two photographs. This one is not only the smallest engine that has yet been built, but it is too small to be run with steam and must be run with compressed air, because steam is too heavy for its needle-point ports. The engine, built by a North Dakota jeweler, is of the rocking-cylinder type and is so small that it will not cover up the letters on a dime. The engine standing on a pedestal, is shown in the lower picture. Its length over all is .255 in. and its weight is 2.5 grains. The cylinder has a bore of .028 in. and a stroke of .036 in., and the flywheel is only .142 in. across.

The "Idaho" has made the best record in target practice of the 21 battleships in the United States navy and has received the trophy for marksmanship.

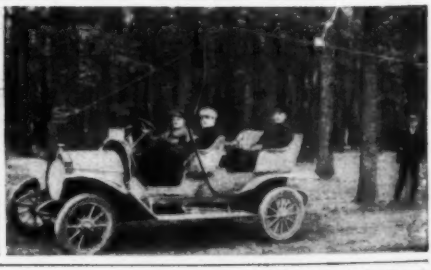
THE ALUMINUM-PLATING OF IRON

Although aluminum-plating of iron has always been a difficult and unsatisfactory operation, a process has just been discovered which makes aluminum adhere to iron so firmly that it cannot be removed by mechanical means, according to the French magazine Cosmos. In the new method, the iron is first tinned, or galvanized, and then plunged into a bath of melted aluminum. While it is immersed it is rubbed vigorously with steel brushes. The tin or zinc leaves the iron and is replaced by a coating of aluminum, and the resulting plate does not tarnish or oxidize by the action of air, water, or heat.

HIGHWAYMAN'S TRAP FOR MOTORISTS

European highwaymen have devised a clever trap for automobilists passing along lonely roads or through woods at night. The robbers stretch a rope or a wire across the road just high enough to catch the front of the automobile or the motorists' heads. Besides stopping the car very effectively so that its occupants can be robbed, the rope often inflicts serious injuries upon the highwaymen's victims. The frequency of this mode of attack has led to the invention of a metal arm which can be attached to the side of the automobile and bent high in the air so that it catches the rope and throws it completely over the car.

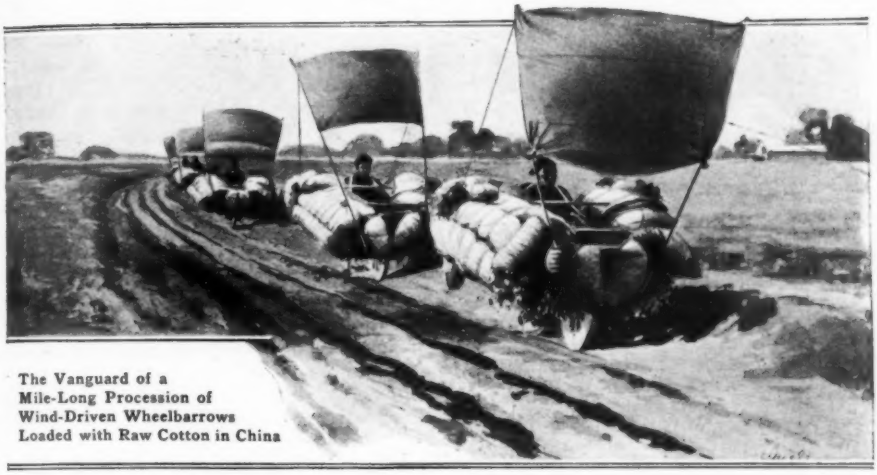
Rope Trap Used by European Highwaymen to Stop Motorists on Lonely Roads at Night



Courtesy of the Sketch

The Metal Arm Which has been Invented to Foil the Robbers

SAILING WHEELBARROWS IN CHINA



The Vanguard of a Mile-Long Procession of Wind-Driven Wheelbarrows Loaded with Raw Cotton in China

The sailing wheelbarrows of China are a sight to delight the eyes of an old salt stranded inland, particularly in the Shensi district, where mile-long processions of these queer vehicles may be met with. Wheelbarrow transportation would be almost impossible in this district, due to the blown sand, were it not for the ingeniously devised sails. Night and day, for months at a stretch without ceasing, the wind blows steadily from west to east at an average velocity of more than 15 miles an hour. Luckily, this chances to be the direction of the country's produce transportation, so that the heaviest laden of the barrow craft are able to "make port" with a fair wind. A wind "dead astern," however, is by no means absolutely necessary, for, by ingeniously contrived supports on the sides of the barrows, the sails may be set to take advantage of almost every slant of breeze.

With a 20-mile wind astern and a not too "choppy sea" in the road, a Shenshi coolie will trot along behind his load of 1,000 or 1,500 lb., at a speed of six or seven miles an hour with scarcely more exertion than a sailor in spinning the steering wheel of a schooner running before a fresh sou'easter. A barrow sailor has to watch his canvas just as closely as does a sailor of the seas, and a gusty wind forces one to reef just as quickly as it does the other.

SPEEDERS RESTRAINED BY POLITE REQUEST

On each of the roads leading into Glendora, Cal., is a sign advising motorists of the speed limits effective within the town, to which is added the statement, "A Reasonable Compliance Will Be Appreciated." This gentle hint is proving more effective in deterring "speed bugs" than the threats of penalties such as are posted on the streets of most cities. For motorists who do not respect this polite request, however, there are the usual laws, with fines and a jail in the background.

GATE VALVE BIG ENOUGH FOR GARAGE DOOR

A gate valve for a water pipe through which an automobile could be easily driven, was recently completed in Germany. The opening in this valve is 7½ ft. wide, 10½ ft. high, and has an area of about 80 sq. ft. This enormous valve is designed both for hydraulic and hand operation. With the hydraulic devices it opens in 7 minutes, while with the hand mechanism about 100 minutes are required. The material used throughout is annealed cast steel of high tensile strength.

Courtesy Engineering Record

FALL OF ROCK IN NEW YORK SUBWAY

A fall of rock, estimated at from 300 to 400 tons, occurred in the Lexington Avenue subway in New York City now under construction, killing nine laborers and a foreman. The fall took place about 20 minutes after a trimming shot had been fired. Examination of the rock surface after the accident revealed two thin water seams from ¼ to ½ in. thick running lengthwise of the tunnel and sloping upward from each side to an intersection about 8 ft. above the neat section of the tunnel, and it was along this cleavage line that the break occurred. The shape of the tunnel roof after the accident was, roughly, that of a gable.

CLEANING AND PAINTING THE CAPITOL DOME

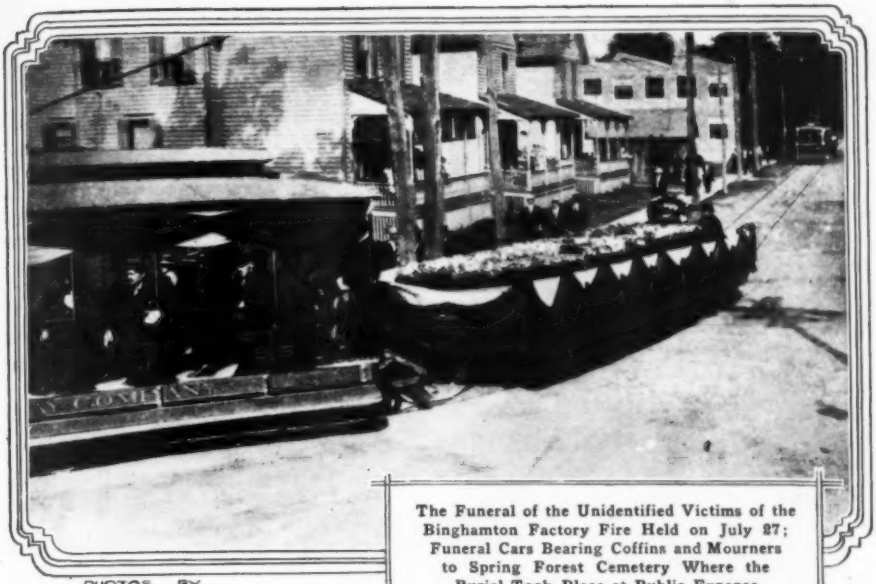
Cleaning the deposit of green from the statue of Freedom that surmounts the dome of the capitol at Washington is a difficult job that is done once every three years. A large scaffold is erected for this purpose, and, since there is no elevator, the material is all carried up by hand. In connection with this year's cleaning the entire dome of the capitol is being painted, a job that requires about a hundred men and ten weeks of time. The dome has about 132,000,000 sq. ft. of surface, and it is estimated that 65 tons of paint, or 240,000 gal., will be required for covering the space.

AN AERONAUTICAL MAP OF THE WORLD

The preparation of an aeronautical map of the world was proposed at the recent International Geographic Conference in Rome, and famous geographers from many countries are to meet this fall to undertake the work. The chart will include the entire world and will be drawn to a scale of 1 to 200,000. The conventional signs, and rules to be followed, will be determined at the meeting.

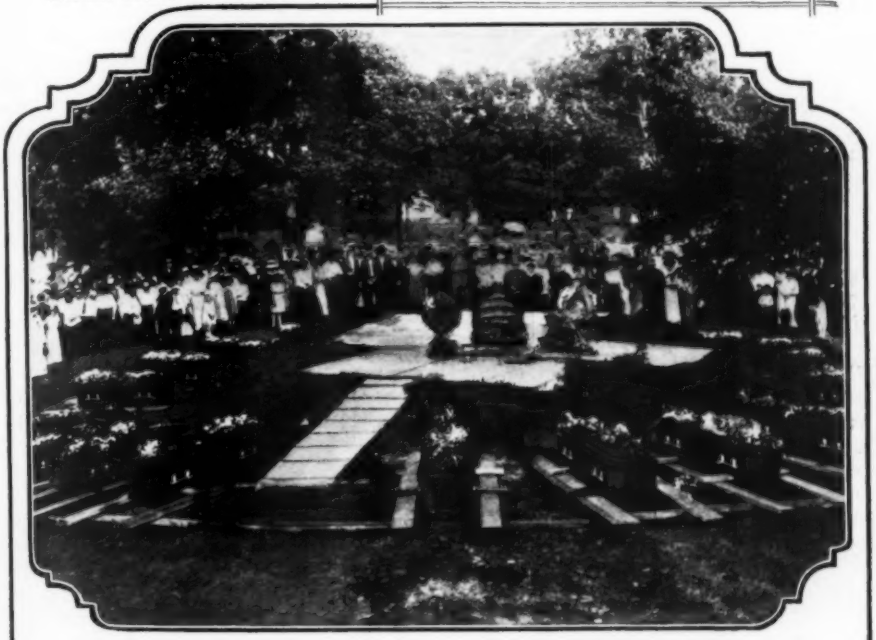
FUNERAL OF BINGHAMTON FIRE VICTIMS

A great public funeral was held in Binghamton, N. Y., on Sunday, July 27, for the 21 unidentified victims of the overall-factory fire on July 21, in which 65 persons were killed. It was a trolley-car funeral because there were not enough hearses and carriages in the city to carry all the bodies and the mourners to the cemetery. The coffins were carried on flat cars coupled behind trolley cars, covered with crepe and flowers. The fire victims were buried in a circle of graves in Spring Forest Cemetery at the city's expense, and a large monument will be erected to mark their graves.



The Funeral of the Unidentified Victims of the Binghamton Factory Fire Held on July 27; Funeral Cars Bearing Coffins and Mourners to Spring Forest Cemetery Where the Burial Took Place at Public Expense

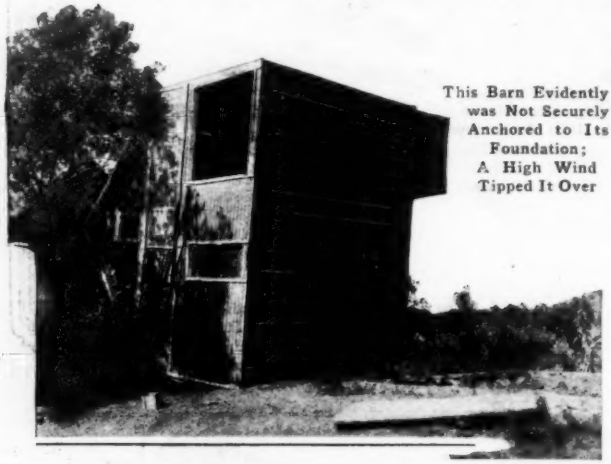
PHOTOS BY UNDERWOOD & UNDERWOOD



The Coffins of 21 Unidentified Victims: A Monument will be Erected in the Center of the Circle of Graves

A BARN OVERTURNED BY THE WIND

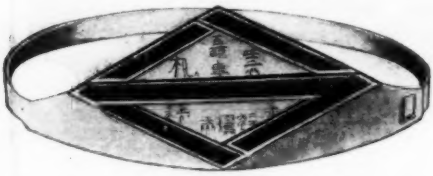
A barn which was overturned by the wind is shown in the accompanying photograph. It was upset during a storm on July 15, at Rockford, Ill., and was left standing on end 20 ft. from its foundation. The building was not greatly damaged, but its interior was rather inaccessible. This is an example of the force exerted by a high wind on the middle western prairies, for this storm was not a tornado.



This Barn Evidently was Not Securely Anchored to Its Foundation; A High Wind Tipped It Over

LICENSE CARD FOR JAPANESE MOTORISTS

A curious license card is issued to motorists by the Japanese government. It is of diamond shape and carries inscriptions in Japanese symbols, as shown in the illustration. It is designed to be fastened around the steering column.



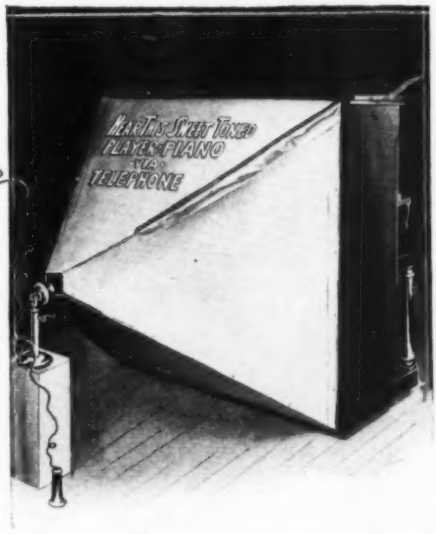
FIGURES SHOW POPULARITY OF MOTORBOAT

Some idea of the popularity of the motorboat is given by the latest statistics, which show that there are now 256,350 motorboats, representing an investment of over $250,000,000, in the United States. The distribution of this kind of water craft is interesting as an indication of the maritime tastes of the inhabitants of the different sections of the country. Practically half of all the motorboats, or 155,800, are to be found in the Atlantic states, where there are four to each 1,000 of population. In the Pacific states there are 50,300 motorboats, or 12 to each 1,000 of population. This big difference in the number per capita between the Atlantic and Pacific states is probably due to the more favorable conditions for pleasure boating along the Pacific coast. By far the biggest section of the country, the middle western states, has only 50,600 motorboats, practically the same as the Pacific states, and an average of only 1 to each 1,000 of population. In the western states where there are more mountains and deserts than water courses of any kind, the number of motorboats is only 250, or 1 to each 10,000 of population.

¶A peculiar use for a motor fire engine was found recently in Kearney, N. J. A policeman arrested a man who had stolen a set of carpenter's tools. The thief broke away and soon outfooted the policeman, who ran into the fire-engine house and requested the use of the motor engine in giving chase. The fire engine raced the thief to a near-by swamp, and then the policeman and crew followed him on foot.

PIANO MUSIC SENT BY TELEPHONE

By connecting a player piano to the county telephone system a piano company in Indiana is in position to supply music to the homes of all the telephone subscribers, and at the same time advertise their business in an effective manner. At first the scheme attracted only a curious crowd, but later the company began to receive hundreds of telephone calls from persons anxious to hear their favorite selections. The music as it comes over the line is of good tone, and where party lines are in operation, as many as 12 families frequently hear the concert at one time. The connection of the player piano with the telephone system is a simple matter, and consists only of a pyramidal housing at the back of the instrument, which focuses the sound to an ordinary telephone transmitter.



Player Piano Connected with Telephone System: Pyramidal Housing at Rear of Instrument Focuses Sound to Telephone Transmitter

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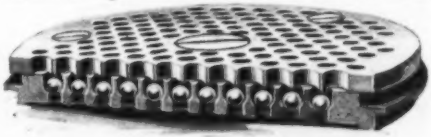
NEW AIR-COMPRESSOR VALVE THAT IS SPRINGLESS

A new type of air-compressor valve which has recently been brought out possesses the advantage of being springless, and, when put together, forms practically a one-piece valve. This valve consists of two plates and a number of small hardened-steel balls. The bottom plate is drilled with a series of holes of two diameters, the top portion of each hole being slightly larger and the lower portion slightly smaller in diameter than the ball, thus forming a pocket for the ball and a seat for it to rest on. The upper plate is drilled to the same template as the lower one, and is so placed that the holes in it are staggered with reference to those in the lower plate. In this way, when the plates are screwed together, the bars between the holes of the upper plate serve as stops for the balls, but leave space for the passage of air. With the upward stroke of the compressor piston the balls are lifted, allowing the air to pass through the openings. On the downward stroke, both the pressure in the reservoir and the weight of the balls act to reseat the balls, closing the openings against the passage of air in the reverse direction.



Air-Compressor Valve in Which the Passages are Alternately Opened and Closed by Steel Balls

STATUES OF COLOSSAL SIZE TO COMMEMORATE

Colossal Bronze Statue of the Great Frithjof, Norway's Legendary Hero, Which Commands the Sogne Fjord. It is 40 Ft. High and was Given by Emperor William of Germany

LEGENDARY HERO AND ABORIGINAL WARRIOR

The Gloomy Figure of America's Indian Chieftain, Black Hawk, Standing Guard Over His Tribe's Lost Hunting Grounds, near Oregon, Ill. It is by Lorado Taft and is 40 Ft. High

MACHINE THAT WASHES AND STERILIZES DISHES

A simple type of dish-washing machine has been invented and placed on the market. This machine consists of

Dish-Washing Machine That Does Away with a Large Part of Kitchen Drudgery

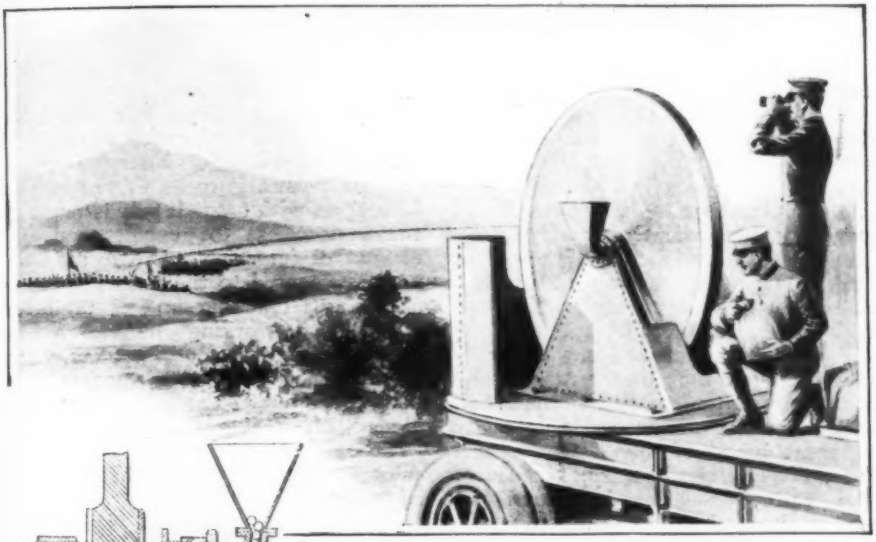
a cylindrical metal tank finished in aluminum and mounted on four stout legs with casters to permit easy rolling about the kitchen or from kitchen to china closet. A pump placed in the center of the tank, and operated by the lever at the top of the machine, works in such a way as to throw the hot water in a strong stream against and among the dishes. China is placed at the bottom of the tank, all pieces being turned toward the center and arranged to drain easily, while glass and silverware are placed in a wire basket near the top of the tank. After all pieces are in place, boiling water is poured into the tank and sprinkled with soap powder, the lid is closed, and the pump handle is worked for one or two minutes. The suds are then drawn off through a faucet at the bottom, scalding rinse water is poured into the tank and the pumping operation is repeated. The dishes are sterilized by the hot water and are so hot when they come from the machine that they dry quickly.

PARCEL POST NOW HANDLES TWENTY-POUND PACKAGES

An increase in the maximum-weight imit and a reduction of rates are among the improvements in the parcel-post system which went into effect on August 15. The maximum weight of packages handled has been raised from 11 to 20 lb., and a simple rate chart has been substituted for the elaborate zone maps. The first zone now comprises the territory included within the local delivery, by city carrier or rural routes, of any office at which the parcel is posted, and the second zone includes all points outside the first and within a radius of 150 miles from the office. Rates in these zones have been greatly reduced. Ordinary stamps are now good for parcels and the insurance fee has been reduced from 10 to 5 cents on values of less than $25. Greater simplicity is the keynote of the recent changes.

NEW CENTRIFUGAL GUN HAS AUTOMATIC FEED

The greatest difficulty in connection with the operation of a centrifugal gun, that of feeding the missiles into the barrel of the revolving disk, has apparently been overcome by an invention recently patented in England. The barrel is arranged radially in a balanced rotating disk and receives the missiles through the axle of the disk, at intervals controlled by an intermittent feed motion. The missiles are placed in a hopper and feed by gravity through a channel in the axle to a slide plate which has an opening large enough to receive one missile. A spring presses this slide against a stationary plate which carries a cam, so that, as the disk revolves, the slide



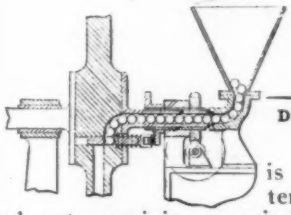


Diagram Showing How Missiles are Fed into Barrel

Missiles Discharged Silently by Centrifugal Gun

is thrust alternately in and out, receiving a missile in one position and discharging it into the barrel of the disk when it reaches the other position. The missile is thrown out through the barrel by the centrifugal action of the disk, and with the disk revolving at a constant speed the missiles will be discharged uniformly in one direction. The entire mechanism can be rotated in a horizontal plane.

PICKING STRAWBERRIES FROM A SEAT

Strawberry picking is made easy by a cart that has been designed to furnish a movable seat for the picker. It enables him to sit comfortably astride a row of strawberry plants, instead of standing at one side and bending over. The cart has two large wheels traveling in the furrows beside the row, and is steadied by a pair of short poles which end in round balls to keep them from sticking in the ground. The axle is dropped low enough to carry a seat just above the plants. The picker, sitting in the cart, pushes himself backward with his feet as he picks his way down the row without leaving his seat. Experiments have shown that the cart enables a picker to gather a third more berries in a day. It was

A Movable Seat Which Makes Strawberry Picking Less Laborious

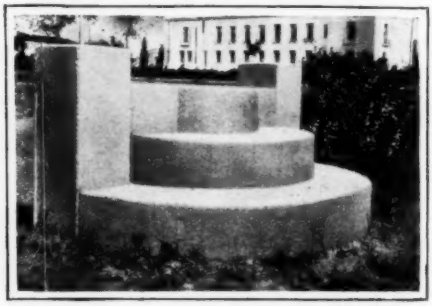
designed by the president of the Second District Agricultural School, at Russellville, Ark., and has not been patented.

THE ART OF CARVING SHELL CAMEOS

The carving of shell cameos is a comparatively modern art, although the fact that it has been gradually dying out during the last century would seem to indicate that it was very old. Not until the sixteenth century was it discovered that the superficial white layer and the delicate underlying colored film of a sea shell made excellent material for the carving of cameos. The Greeks and Romans, although they made cameos out of layered agate, knew nothing about shell carving, probably because the Mediterranean did not supply suitable shells. When shell carving first came into vogue, many different kinds of shells were tried, but all were found faulty, because of size, color, or lack of permanence, except one variety of the helmet shell. Of this variety, only one out of many shells is fit to use because the making of a cameo demands a strong, evenly colored under layer, a solid outer layer, and sufficient usable surface. The process of carving the shell requires great skill and delicacy. If the shell is to be carved as a whole, the artist takes advantage of the fact that the coloring of the inner layer is richest next the mouth of the shell and the ridges on the last whorl are thick enough to permit deep carving. For commercial purposes, the shell is usually cut into pieces with a tin wheel, running water, and emery powder. The piece that is to be carved has to be shaped with a small grindstone and the surface has to be smoothed and cleared of imperfections. A piece of paper cemented to the back keeps the shell from cracking and is used for fastening a working handle to the cameo. After the design has been drawn on the outer surface with a pencil it is cut in the soft white outer layer with steel gravers much like a wood-engraver's tools. The naturally colored inner layer, which becomes the background, requires polishing and developing with pumice and acid, rubbed in with a boxwood stick. The whole process must be carried out with great care, because the shell is very fragile and can easily be broken or corroded by the acid used in polishing. The photographs of some of the cameos on exhibition in the Morgan gem collection at the American Museum of Natural History, New York, indicate the existence of various schools of shell carving.

CONCRETE HORSE BLOCKS IN WASHINGTON

Concrete horse blocks to enable women riders to mount or dismount without the assistance of an escort or groom have been erected at the city-side entrances to the saddle paths of Potomac Park, Washington. No assistance is needed by women who ride astride, unless they are very short and their horses are very tall, but some sidesaddles are still used, and the theory is that women riders will have their mounts led from the stable to the soft bridle paths to avoid riding over the hard city pavements. The horse blocks are semicircular in shape and have three steps with square posts at the ends. The one in the picture stands near the Pan-American Building at the end of the drive from Seventeenth Street to the John Paul Jones monument.



Concrete Horse Blocks Erected beside Washington Saddle Paths for Women Riders

Cameo with Brown Background Illustrating an Italian Artist's Conception of the "Metamorphosis of Actaeon"

A Rare Example of the Art of Carving Cameos on the Surfaces of Sea Shells: Guido Reni's "Aurora" Carved on a Madagascar Helmet Shell

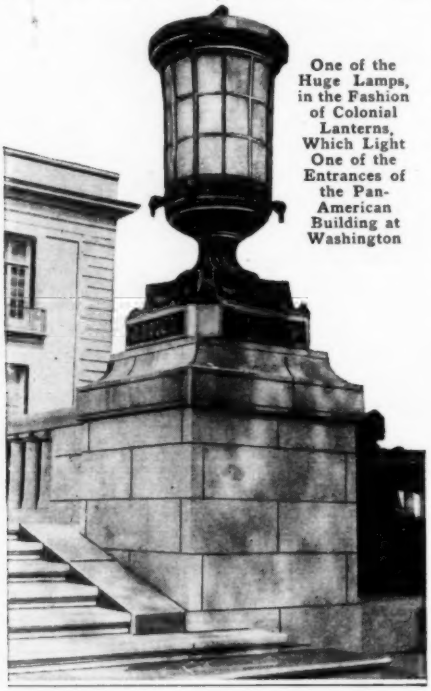
Engraving of an Emblem on the Surface of a Pearly Nautilus Shell

A Cameo, "Phoebus in His Chariot," Remarkable for Its Finish

Photos by American Museum of Natural History

ANCIENT LANTERNS COPIED IN BRONZE LAMPS

Two huge lamps, built in imitation of old-fashioned lanterns with 36 small panes of frosted glass, shed their soft



One of the Huge Lamps, in the Fashion of Colonial Lanterns, Which Light One of the Entrances of the Pan-American Building at Washington

glow over the broad, low marble steps at the east entrance of the Pan-American Building, at Washington. Each lantern, done in gray-green bronze, is taller than a man and stands on a square pedestal high over the heads of passers-by. The four corners of each lamp's base end in lion's paws with extended claws, and six tiger heads stand out from the panel below the glass. The circular lantern globes have three rows of small panes in imitation of old colonial windows, and about the same size. The tops are like the covers of huge tureens. The lanterns are beautiful in themselves, but blend with the other artistic features of the white marble building so that they are hardly noticeable except as a part of the whole design.

MACHINE FOR ADMINISTERING ANESTHETICS

A machine to replace the manual method of administering anesthetics during an operation, has been brought out in France. By means of a pump, an evaporation chamber, and an automatic device used for introducing a measured quantity of chloroform, for instance, the apparatus maintains a continuous flow of a definite, standardized mixture of anesthetic and air. A valveless mask enables the patient to breathe in a current of air containing a known amount of chloroform, and the danger and annoyance attending a too rapid or too slow administration of the anesthetic are eliminated. A tube passed into the nose or mouth can be used instead of the mask after anesthesia has been produced, for operations upon the face. The advantage of the machine lies in the fact that the surgeon knows exactly how much anesthetic he is giving, and the continuous flow eliminates much of the discomfort attending the taking of an anesthetic.

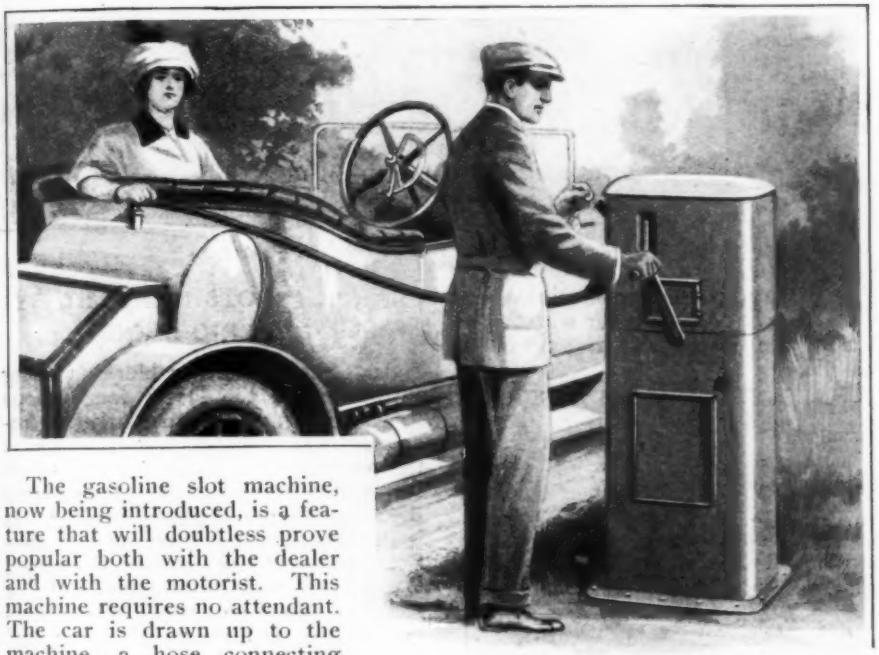
ANCIENT FISHING BOATS OF SOUTH WALES

A group of the strange fishing boats, called coracles, which have been used for generations and are still used on the coast of south Wales, is shown in the accompanying picture. The villagers,

Villagers of South Wales Carrying Their Ancient Fishing Boats Called Coracles

carrying their craft just as their ancestors must have carried theirs, are on the way to a coracle race in the Swansea regatta.

SLOT MACHINE SUPPLIES GASOLINE



Gasoline Slot Machine Designed for Convenience of Motorists

The gasoline slot machine, now being introduced, is a feature that will doubtless prove popular both with the dealer and with the motorist. This machine requires no attendant. The car is drawn up to the machine, a hose connecting with the car tank is inserted, a half-dollar is dropped into the slot, and the crank is turned. This sets a pump in action which delivers the gasoline into the tank of the car. A graduated gauge at the front of the machine shows the buyer just how much gasoline he is getting, while, if the supply happens to be exhausted, the money is automatically returned. The mechanism is adjustable to deliver the fluid at current prices.

LEIPZIG RAILWAY STATION LARGEST IN EUROPE

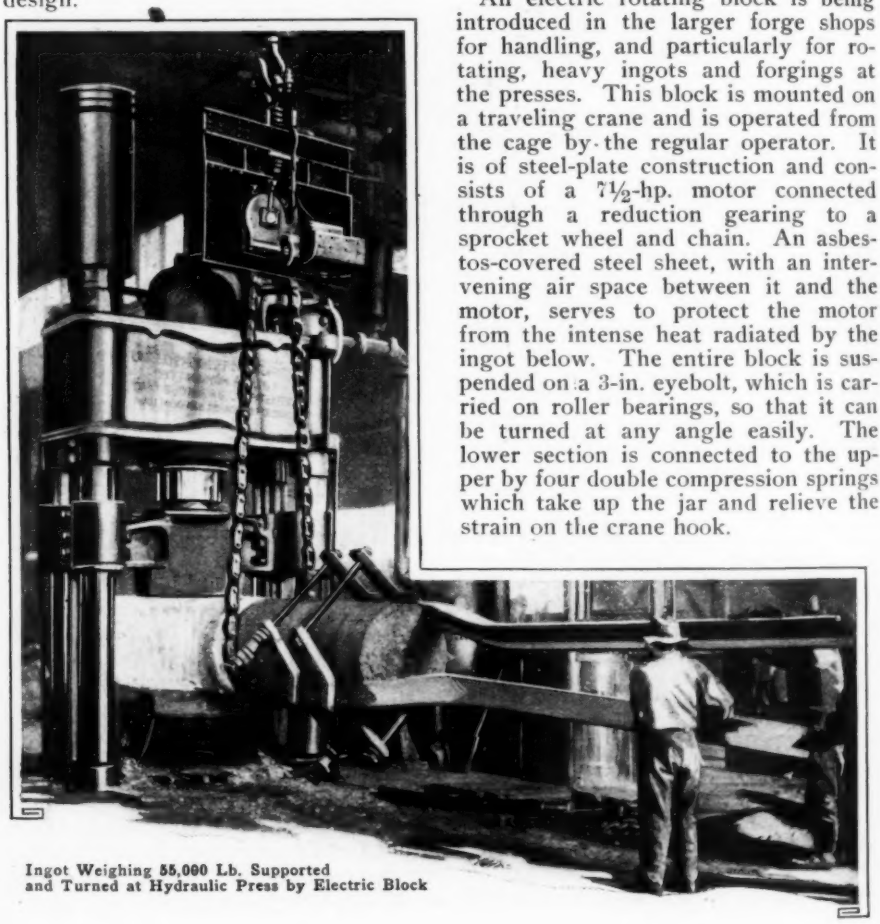
The largest railway station in Europe, estimated to cost $35,000,000, is now under construction at Leipzig, in the kingdom of Saxony, Germany. This station is designed to serve as a terminal for all the railways entering Leipzig, which, in addition to being a famous university city, is one of the most important railway and industrial centers in the German empire. The location of this city is near the boundary between Saxony and Prussia, and the cost of the structure is to be borne in varying proportions by the Saxon State Railways, the Prussian State Railways, and the city of Leipzig. The station is divided into two equal portions, one half being the property of the Saxon administration and the other half the property of the Prussian administration. There are to be 26 platforms, and, under normal conditions, there will be no crossings on the level between the different lines. Half of the station is already completed. The completion of the remainder of the station in two years, as planned, will mark an enormous advance in the construc-

Completed Half of the Railway Station at Leipzig, Germany, Which is to be the Largest Railway Station in Europe

tion of large passenger terminals, and will place Europe on a par with America in the matter of railway-station design.

LARGE INGOTS HANDLED BY ELECTRIC BLOCK

An electric rotating block is being introduced in the larger forge shops for handling, and particularly for rotating, heavy ingots and forgings at the presses. This block is mounted on a traveling crane and is operated from the cage by the regular operator. It is of steel-plate construction and consists of a 7½-hp. motor connected through a reduction gearing to a sprocket wheel and chain. An asbestos-covered steel sheet, with an intervening air space between it and the motor, serves to protect the motor from the intense heat radiated by the ingot below. The entire block is suspended on a 3-in. eyebolt, which is carried on roller bearings, so that it can be turned at any angle easily. The lower section is connected to the upper by four double compression springs which take up the jar and relieve the strain on the crane hook.



Ingot Weighing 55,000 Lb. Supported and Turned at Hydraulic Press by Electric Block

THE COLLINWOOD SCHOOL MEMORIAL

A beautiful garden has been laid out on the site of the Collinwood School, in Cleveland, O., in memory of the 173 children who lost their lives in the fire which destroyed it on March 4, 1908. The garden was planned by the schoolmates of the dead children, and its care is left to them. Some of the winding paths and blossoming flower beds and the white colonnade which follows the lines of the walls of the old building are shown in a photograph on this page. A quiet pool, fringed with reeds and covered with water lilies, marks the spot where 162 little bodies were found piled against the west doors of the burned schoolhouse. A garden was considered a more fitting memorial than a bronze statue or marble shaft.

Memorial Garden Which has been Laid Out on the Site of Collinwood School, Where 173 Children Lost Their Lives on March 4, 1908

Where 162 Children were Burned to Death, Now the Site of a Lily Pond

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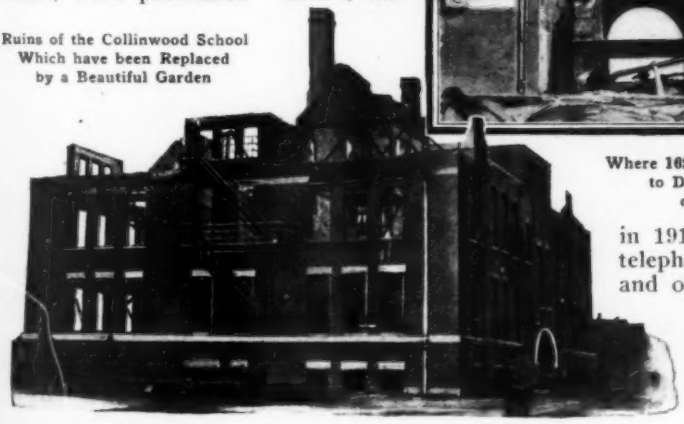
¶ Exactly 3,418,020 timber sticks, mainly cedar, were purchased in 1911 to be used as telephone, telegraph, and other electric-purpose poles. This was 452,674 less than the number purchased in 1910.



Ruins of the Collinwood School Which have been Replaced by a Beautiful Garden

SAMPLE STALK OF 93-INCH RED-TOP HAY

A stalk of red-top hay, 7 ft. 9 in. tall, which was grown on low, swampy ground on a farm near Fennimore, N. Y., is shown in this photograph. From 20 acres of this hay, sowed one, two, and three years ago, 31 tons were cut last year, 20 tons this year, and about one-third of the crop is still standing. The seed came from Wisconsin and grows best in wet soil.

A Stalk of Red-Top Hay, 7 Ft. 9 In. Tall

LIMITING THE SPEED OF GASOLINE SECTION CARS

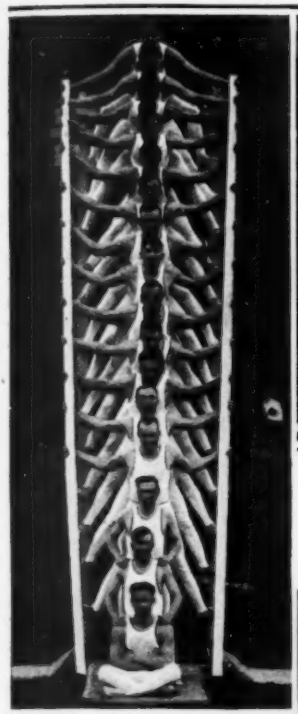
A gasoline railroad-section car that is automatically limited to a speed of 20 miles per hour has been brought out with the idea of eliminating the danger of speeding, which is one of the greatest objections to power-driven cars for this class of service. The car is controlled by a governor-timer which cuts out the ignition when the speed of the car goes above the limit for which the governor is set. This is accomplished by means of two weight arms revolving on the governor shaft, one of which carries a roller that makes contact, at normal speeds, with stationary rollers, causing sparks successively in the corresponding cylinders. The two weight arms are held together by a tension spring, but are forced apart by centrifugal action when the speed exceeds 20 miles per hour. The traveling roller is carried on an arm that projects from the weight to the opposite side of the shaft, and when the weights are forced apart the roller is drawn in about $\frac{1}{32}$ in., and misses contact with the stationary rollers. This causes the engine to miss explosions until the speed is reduced to the limit. The governor-timer mechanism is inclosed in a case which is kept locked by means of a wire seal. In an emergency requiring high speed, the seal is broken, the spring is adjusted to a higher tension, and the car can then be speeded up to 35 or 40 miles per hour.

WIRELESS ANTENNAE WITHIN A CATHEDRAL

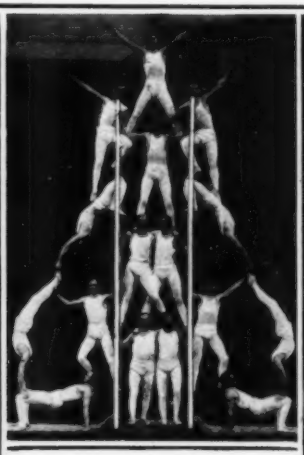
The penetrating power of electrical waves has been demonstrated in a remarkable way by the successful operation of a wireless station installed in the Cathedral of Florence, with its antennæ entirely within the edifice. The antennæ, consisting of three wires, are stretched from the inside of the cupola to a pillar in the interior of the cathedral and the apparatus is grounded on a lightning rod which ends in a well in one of the walls. To reach the apparatus, wireless waves must pass through several thick walls, and it is probable that much of the electrical energy is intercepted and carried to the earth by the many lightning rods on the cupola. In spite of these obstacles, very distinct messages have been received from the Eiffel Tower, from Nordeich, Germany, and from Toulon, France. No attempt has been made to send messages out from the antennæ within the cathedral.

¶The fishermen of Madagascar sprinkle the lakes a' ' streams with a poisonous substanc nich causes the fish to become paralyzed and float to the surface, when they are fished out by hand and eaten without danger.

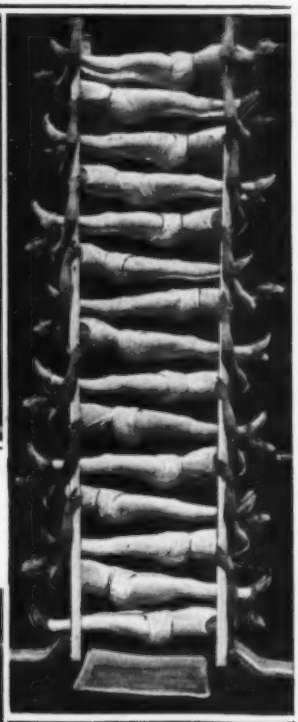
PROFESSIONAL "STUNTS" OF AMATEUR ATHLETES



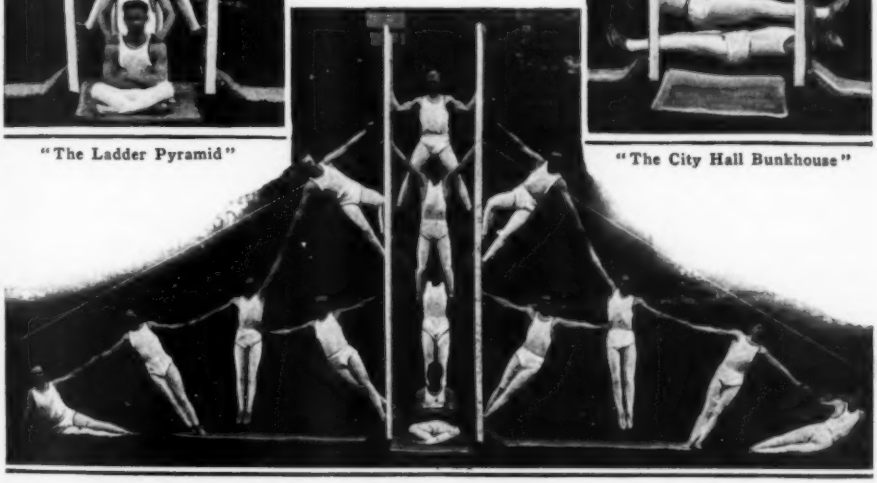
"The Ladder Pyramid"



The Novel Pyramid Effects Shown Above and Below are Such as to Require a Grade of Skill and Endurance Seldom Shown by Any but Professional Athletes



"The City Hall Bunkhouse"

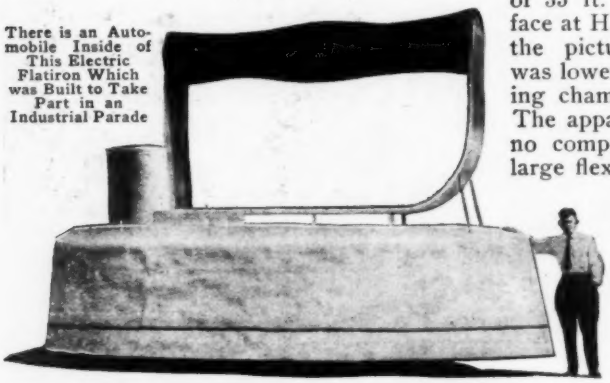


Some of the "stunts" carried out by the athletes of the Bloomington, Ill., Y. M. C. A. compare favorably with the work done by professionals, as will be seen from the accompanying reproductions of photographs taken at the time of the recent annual gymnastic performance. Of the various features, those known as "The Ladder Pyramid", and "The City Hall Bunkhouse" attracted the greatest attention.

¶ The monster bronze eagle figurehead on the liner "Imperator" has four eyes, and a lookout is stationed inside of it to watch for danger ahead.

FLATIRON LARGER THAN AN AUTOMOBILE

A huge electric flatiron, large enough to conceal completely an automobile inside of it, "ironed" its way down the streets of Merrill, Wis., in a recent industrial parade. It was a good reproduction of a standard electric iron, in wood, paper, and cloth, of sufficient size for half a dozen men to stand under its handle. An electric automobile, entirely hidden underneath, furnished the motive power.



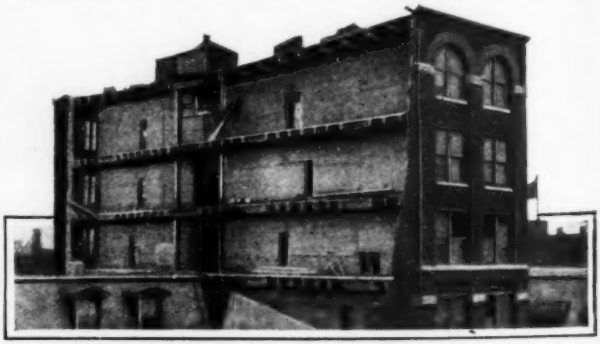
There is an Automobile Inside of This Electric Flatiron Which was Built to Take Part in an Industrial Parade

SUBMARINE PICTURE TAKEN IN DEEP WATER

Some remarkable submarine photographs of fishes, divers, and other objects, were taken recently at a depth of 35 ft. below the water's surface at Hampton Roads. To take the pictures, the photographer was lowered from a boat in a diving chamber with a glass front. The apparatus was novel in that no compressed air was used; a large flexible tube which extended from the top of the diving chamber to the surface of the water supplied enough fresh air for three men to remain below for hours. Natural light was used for pictures taken in the daytime, but for night photographs four powerful electric lights with reflectors were lowered into the water from the boat. The lighted chamber attracted all sorts of fish within the range of the camera, and some good snapshots were made of expert swimmers and divers 30 ft. below the surface.

BRICK BUILDING STANDING WITHOUT SIDE WALLS

A building which appears to be resting upon its end walls without any side support, while its side walls are being wrecked and replaced, is shown in a picture on this page. The six-story structure, 125 ft. long and 25 ft. wide, stands on the second lot of the block and the owner wished to build a new six-story building on the corner and connect the two without a dividing wall—all to be done without disturbing the tenants. To make the building strong enough, the engineers decided to wreck and replace the two brick side walls. They jacked up each floor on screw posts, 2½ ft. apart and 6 ft. from the old walls, resting on 6 by 14-in. wooden floor beams and braced with heavy

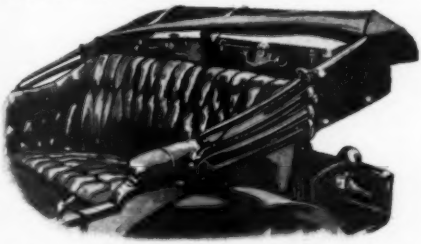


A Building Resting on Its End Walls and Jack-Screw Supports While Its Side Walls are being Wrecked and Replaced

planks. This left the building without side walls as shown—its elevator and stairways are exposed and a tinware factory is operating inside. When the work reached this stage, the city condemned the building as unsafe and a fire trap, and the engineers decided to wreck it completely, floor by floor, and build a modern structure in its place.

LUGGAGE CARRIER IN PLACE OF AUTO TOP

An automobile luggage carrier which keeps its load dry and clean and within easy reach of the occupants of the car has appeared in California. It is constructed of steel bows and arms and hangs over the back of the tonneau like a folded top—in fact, it is a false top and top cover, large enough to carry two suitcases, several robes and overcoats, and other articles. This



An Automobile Luggage Carrier Which Resembles a Folded Top

luggage carrier is especially useful in the rainless sections of California, where automobile tops are becoming more or less obsolete.

TALKING CLOCK THAT CALLS THE HOURS

Speaking clocks are now being made. A German inventor has just patented a talking clock which calls out the hours, half hours and quarter hours in a pleasant, natural tone of voice, instead of announcing them by beating the proper number of strokes on a bell. The power of speech is given to the clock by a phonographic record of spoken words on a film that is wound through the clock's machinery. At each quarter hour a small phonograph, with horn and sound box within the clock,

Photo by Paul Thompson

A Talking Clock That Speaks the Time of Day: The Phonograph is Shown Beside the Finished Clock

catches the words recorded on the film and reproduces them aloud.

EXTREME CASE OF BUCKLED RAILS

The expansion of rails from the heat, with consequent buckling, is one of the dangers for which railroad trackmen are constantly on the lookout during the hot months of the summer, but it is not often that so extreme a case as that shown in the illustration occurs. In this case the danger was discovered in time to prevent an accident, and the bent rails were quickly replaced by new rails, between the ends of which plenty of space was left for expansion.

¶ Patents have been issued in France on a metal trunk which is constructed by welding thin sheets of steel by means of the oxyacetylene flame.

DIAMOND RATTLESNAKE NECKLACE

A diamond rattlesnake, to be worn as a necklace, was recently finished by a Philadelphia jewelry firm after half a

A Rattlesnake Necklace Made of Platinum and Set with Over 750 Diamonds

year's work. It is a perfect model of a North Carolina diamond rattlesnake, 18 in. long, made of a flexible platinum frame, invisibly linked and thickly studded with perfectly cut diamonds. The 629 stones used in the body alone weigh over 30 carats. The head is covered with 112 small diamonds cut in imitation of the scales on a snake's head. Its eyes are deep velvet-green emeralds, ¼ carat each, and the crown of the head is one large canary diamond, weighing 4½ carats. The gold fangs and tongue control a tiny gold spring which locks the jaws over any part of the snake's body that the mouth touches. Each scale of the body, 629 in all, is carved separately and set with a perfect diamond, the size of the stones varying with the taper of the body. The rattles are also flexible and each one is set with a diamond; the tip ends with a very small stone. The case for the necklace is covered with real rattlesnake skin and has a monogram carved in the form of writhing serpents.

WATER-POWER DEVELOPMENT IN CALIFORNIA

The greatest water-power development in the history of California is now under way, and most of the plants proposed, or being constructed, will occupy national-forest lands under permit from the Secretary of Agriculture. The first step in this development is the "Big Creek Project," by which about 150,000 hp. will be transmitted for a distance of 240 miles into Los Angeles and vicinity. The power will be transmitted over a double steel-tower line strung with stranded aluminum cables, and at a pressure of 150,000 volts, which is more than the highest voltage so far used in commercial transmission in the United States. Another big project is that on the north fork of the Feather River, where a reservoir of 43 square miles is to be constructed and a power plant of about 350,000-hp. capacity is to be built. Plans are also being made for the development of four plants on the Kern River, while on the South Yuba River one of the highest masonry dams in the world is to be built.

ALUMINUM-SOLED SHOES FOR LABORERS

Shoes with aluminum soles are now made for farmers and laborers who are required to work in water or on damp floors. The top of the shoe is of leather and the sole is a continuous piece of aluminum which covers the entire bottom and folds

up along the sides. Between the foot and the metal is a heavy felt insole, and the heel has a core of wood to decrease its weight. Lack of flexibility in the sole is made up for by a bar under the ball of the foot which gives a buoyant roll to the step and prevents flat-footed walking. Aluminum is used in preference to any other metal because it combines lightness with great durability,

the soles wearing longer than rubber and being more impervious to water. The shoes are made in three heights and are comparatively inexpensive.

FLYING BICYCLES STILL UNSUCCESSFUL

The possibility of flying without a motor was given another try-out at a recent competition in Paris and every attempt ended practically in failure.

A Wrecking Crew Raising a Locomotive Which Left the Rails and Rolled Down an Embankment on Its First Trip

Fifty bicycles, equipped with wing planes and propelled by muscular effort alone, entered for the $2,000 prize for a minimum 10-yd. flight, and the competition lasted for three days. All kinds of machines took part, but they were divided mainly into two classes: those depending upon small flat kites to raise them after they had reached a high rate of speed, and those equipped with wings, rudders, and elevators, like monoplanes or biplanes. One cyclist after several attempts succeeded in keeping his rear wheel off the ground for a distance of three yards. Tire marks on a whitewashed cement track indicated clearly the start and finish of the flight.

LOCOMOTIVE DERAILED ON ITS FIRST TRIP

The raising of a locomotive that left the track and rolled down an embankment on its first trip is shown in the accompanying photograph. The engine, which was a new one on its way from the builders to the Southern Pacific Railway, went into the ditch on the line of the Southern Railway, eight miles from Birmingham, Ala. The wrecking crane has a tackle attached to the locomotive's frame and the derailed tender can be seen hanging over the bank near the water tower. One man had an arm and a leg broken in the wreck.

IRON PIPE USED AS A PROP FOR YOUNG TREES

Simple, inexpensive tree supports, to keep young saplings from being bent over by the wind, can be made of a piece of iron pipe and a couple of feet of hose. They are strong and rigid and do not injure the tender bark of the trees, A long piece of galvanized-iron pipe is driven into the ground beside the sapling and a loop of wire, slipped through a piece of hose, is passed around the tree and twisted securely about the upper end of the pipe. A pipe on each side of the tree would make a stronger support, but a single piece is enough to protect a very young tree. The prop was invented by a woman in New Haven, Connecticut.

APPARATUS FOR GAUGING BREATHING EXERCISES

A French physician has devised a simple apparatus by which breathing exercises, which are usually taken in a haphazard manner, may be taken systematically and on a progressive scale and without the risk of overworking weak lungs. A bottle of known capacity and carrying a graduated scale is filled with water, and is inverted and placed in a vessel containing water, so that the liquid in the bottle is retained by the atmospheric pressure. A rubber tube is inserted in the neck of the bottle. The patient inhales through the nose in a natural manner and expels the breath through this tube into the bottle, the air gradually displacing the water in the bottle. The process is continued until all water in the bottle is displaced by air. In this way an accurate measurement of the extent of the breathing exercise is given. The apparatus is intended to be used in the open air or in a well ventilated room.

A MACHINE FOR SORTING ROLLER BEARINGS

Balls and rollers for bearings are sorted according to size by a new electrical machine which is capable of detecting a difference of ¼ of a ten-thousandth of an inch in the diameter of the units. It is impossible, in the manufacture of millions of balls and rollers, to have the limit of error exactly the same in all of them, but proper sorting obviates any trouble resulting from inaccuracy. The machine which has been invented for the purpose consists of a revolving steel disk with a series of very delicate plungers, or gauges, arranged around its edge at varying distances from the center. Rollers to be sorted are fed on to the disk and moved slowly past the plungers. Somewhere in the circuit every roller strikes a plunger and an electrical contact is made which drops the roller into a canister. Each canister thus receives rollers that are of exactly the same size and, when bearings are assembled, all the rollers in any bearing must come from the same canister.

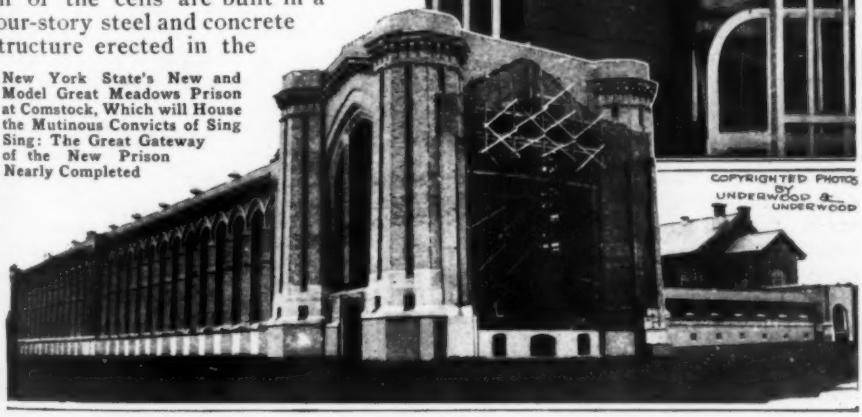
THE GREAT MEADOWS PRISON NEARLY COMPLETED

The Great Meadows prison, New York State's new model penitentiary at Comstock, is being rushed to completion to receive the mutinous convicts who have made old Sing Sing prison a place of fire and riot. The

The Cells are Arranged in Four Tiers in the Center of the Building, Separated by a Corridor from the Outside Walls. One of the Fireproof, Sanitary Cells in the New Prison is Shown in the Right-Hand View

new prison is not only fireproof and a model in every way, but a massive, commanding piece of architecture as well. The arrangement of cells in the new building is designed to afford an abundance of light and air, to the corridors as well as the cells, and to minimize the opportunity of escape. Instead of being ranged along the outside walls around central corridors, all of the cells are built in a four-story steel and concrete structure erected in the center of the building and separated from the outside walls by a corridor all the way around. No escape from the cells is possible except across this corridor in plain sight of the guards. Each cell has its own plumbing and is ceiled to afford thorough sanitation. The use of sliding doors prevents obstruction of the passage when cells are opened.

¶ Heligoland, an island in the North Sea, has been converted into a rendezvous for Germany's airship fleet. Its honeycombed cliffs have been bolstered up with concrete, and it is armed to withstand a three-years' siege.



New York State's New and Model Great Meadows Prison at Comstock, Which will House the Mutinous Convicts of Sing Sing: The Great Gateway of the New Prison Nearly Completed

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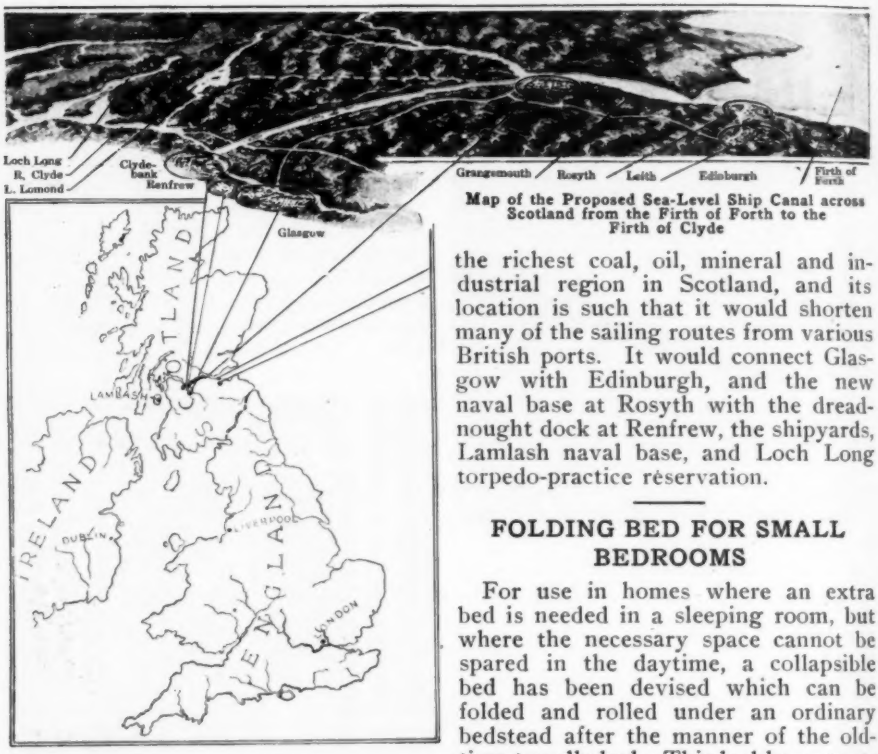
MID-SCOTLAND SHIP CANAL PROPOSED

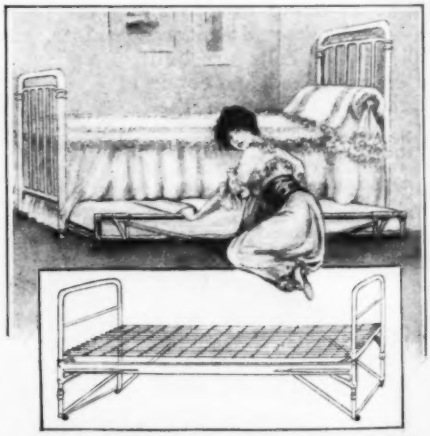


Map of the Proposed Sea-Level Ship Canal across Scotland from the Firth of Forth to the Firth of Clyde

A sea-level ship canal across Scotland from the Firth of Forth to the Firth of Clyde has again been proposed and is receiving serious consideration. It is an undertaking that would cost about $120,000,000 and require five years for completion. The route proposed is not the Loch Lomond route that was suggested 25 years ago, but a "direct route" nearer Glasgow. There is now a small barge canal, built in 1790, along this line, but the present plan proposes the building of a separate sea-level canal with no locks except sea locks at the ends. The distance is 29 miles and the proposed canal would be 148 ft. wide and 36 ft. deep. Little cutting would have to be done except through sand and gravel, as the sea once covered this territory. The valley which the canal would follow is the richest coal, oil, mineral and industrial region in Scotland, and its location is such that it would shorten many of the sailing routes from various British ports. It would connect Glasgow with Edinburgh, and the new naval base at Rosyth with the dreadnought dock at Renfrew, the shipyards, Lamlash naval base, and Loch Long torpedo-practice reservation.

FOLDING BED FOR SMALL BEDROOMS

For use in homes where an extra bed is needed in a sleeping room, but where the necessary space cannot be spared in the daytime, a collapsible bed has been devised which can be folded and rolled under an ordinary bedstead after the manner of the old-time trundle bed. This bed has permanently attached casters on which it can



Collapsible Bed Folded and Ready to be Rolled under Any Standard Bedstead

be moved either when set up or folded. By compressing a spring at the head or foot, catches are released and the bed folds automatically, while, for setting it up, it is only necessary to lift the ends to an upright position, when the catches snap into position and hold the parts secure. The parts fold in such a way that it is not necessary to remove the bedding.

RUBBER FLOWERS SOLVE BATHERS' PROBLEM

Rubber flowers to be worn on bathing suits is one of the latest novelties in the way of personal adornment. Bathing suits were originally intended for bathing, but with the increasing popularity of the seaside resort they have come to be rather extensively used for general display on the beaches, and, consequently, have been made more ornate each year. A bathing suit that will stand the water is still necessary, however, since it has not yet come to be good form to put on a bathing suit and not take at least a momentary dip, and this condition has served as a bar to the use of feathers and flowers for the purpose of adornment. Delicately tinted flowers such as roses and violets are now provided for the convenience of bathers, and these may be worn while taking a dip or an extended swim without danger of injury.

MOTOR TRUCKS DISPATCHED BY TELEPHONE

A telephone-dispatching system to direct automobile trucks used in interfactory deliveries has recently been installed by a large automobile manufacturing company. Most of the deliveries between the company's various factories are made by 22 motor trucks and 10 horse-drawn vehicles in the streets. To get the greatest amount of service from them, the company has put them in charge of one dispatcher who directs them from one loading station to another by telephone. The dispatching system has been found to effect a considerable annual saving.

BORING HOLES IN AWKWARD PLACES

An auger with a long reach for boring holes in inconvenient places is being manufactured for electricians and engineers. By its use a workman can stand on the floor and bore a hole at any angle in a beam or joist in the ceiling or anywhere within 14 ft. The drilling head which holds the bit is operated by a leather strap running over a spring drum; the bit is turned as the workman pulls the strap and the spring drum winds up the strap ready for another pull. The head is mounted on a telescoping handle which can be extended from 4 ft. 10 in. to 14 ft. 3 in. For vertical or angle boring an attachment with a pulley for the strap is fitted between the handle and the head. One second is required for the longest pull and the rewinding, and four or five pulls will bore a hole through a 2-in. joist.

HANDLING THE MAIL FOR FOREIGN LABORERS

Mail for foreign laborers who are unable to speak English is handled in an unusual way in the post office of Coatesville, Pa. Of the 14,000 people in the town, about one-fourth are Italians, Russians, Hungarians, and Rou-

manians, employed in the steel and rolling mills. In order to overcome the language difficulties, the post office has a separate department for these foreigners. It consists of two glass cases, built in the wall between the lobby and the clerical room and provided with clips to hold up the letters so that their addresses can be read from the lobby. The foreigners look over the mail in the cases and when one finds a letter addressed to him he points it out to a clerk and receives it. There are at times 200 letters in the cases, and as many of them come "postage due," because the senders are too poor to pay for them, the collections sometimes amount to $15 a day.

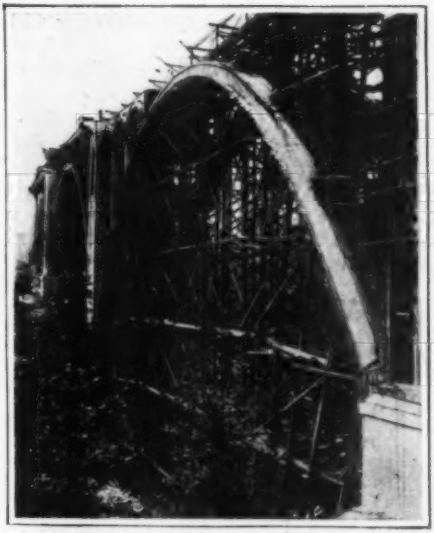
Special Post-Office Department for Letters Addressed to Foreign Laborers Who cannot Speak English: The Letters are Displayed in the Cases at the Right

WATER-SUPPLY SYSTEM OF WOOLWORTH BUILDING

A water-supply system that is larger and more complicated than that of most small cities has been installed in the Woolworth building in New York City. This office building, which is the highest in the world, has 55 stories above the street level and three stories below the street level, making a total of 58 stories, and the water-supply system proved to be one of the biggest problems in connection with the equipment. Water is taken from several connections with the city mains at an average pressure of 22 lb., while, for use in emergency only, there is a connection with one of the high-pressure fire mains. All the water is metered and filtered, and, with the exception of that used below the second story, is pumped into storage tanks located at different levels. Each tank furnishes a gravity supply for the stories between it and the next tank lower down, the tanks being so spaced as to keep the pressure within safe limits. With this arrangement high pressures are only developed in the pump connections to the upper tanks. For supplying water in the main portion of the building there is a 6,000-gal. tank at the fourteenth-floor level and a 20,000-gal. tank at the twenty-seventh-floor level. In the tower there is a tank of 3,100-gal. capacity at the thirty-eighth floor, one of 9,900-gal. capacity at the fiftieth floor, and one of 1,200-gal capacity at the fifty-third floor, more than 40,000 gal. being thus available at all times.

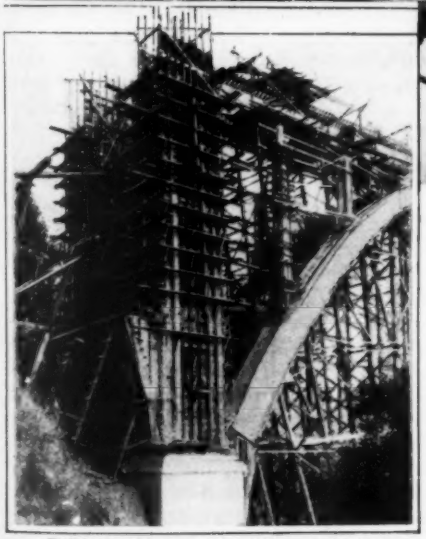
CONCRETE-ARCH BRIDGE OF UNUSUAL SIZE

A reinforced-concrete arch bridge that will rank as one of the largest of its kind in the world is now being completed at Pasadena, Cal. This bridge spans the Arroyo Seco, a dry valley between Pasadena and Los Angeles, and is 1,468 ft. long, 38 ft. wide, and has its floor at a level of 167 ft. above the ground. It consists of nine spans, one span being of 223 ft., two of 151 ft. each, and six of 113 ft. each. There is no provision for street cars, the bridge being designed only for highway and pedestrian traffic. Along the center of the bridge is an asphalt road 28 ft. wide, and on each side of this is a 5-ft. sidewalk. Over each pier are bays projecting 8 ft. beyond the sidewalk line and provided with concrete benches.



A General View of the Bridge During Construction

A Close View of the Completed Structure



Building a Pier with Its Adjacent Arches

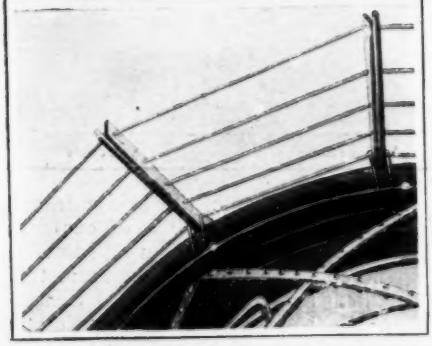
The construction of this bridge called for more than 10,000 bbl. of cement, while the sand and gravel used in making the concrete was secured from the river bed below the bridge. Corrugated steel bars with an ultimate strength of from 60,000 to 70,000 lb. per square inch were used for reinforcing the concrete. The piers, on which the main arches are carried, rest on footings of gravel and boulders which have been tested to 11,000 lb. to the square foot. The roadway is supported on a

series of secondary arches carried on the main arches. The construction of the bridge required a force of 75 men working for over a year.

SAVING BIRDS IN ENGLISH CHANNEL FLIGHT

In their semiannual migration across the English Channel, thousands of birds are killed through the fascination of the

How Lighthouses Attract Birds



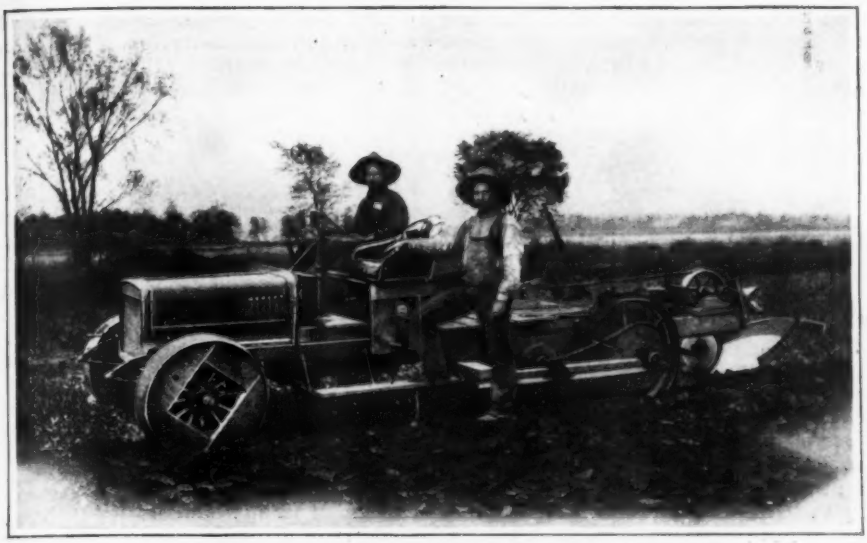
A Series of Perches, in Range of the Light, Saves the Birds by Giving Them a Resting Place

channel lights that line the southern coast of England, and a movement has been started in that country looking to a simple and inexpensive prevention of this unnecessary slaughter. During the autumn the birds cross the channel to the shore of France, returning to England in the spring. It is during the northward trip that the greatest slaughter takes place. It is estimated that the numerous lights, afloat and ashore, between the Start lighthouse, on the west, and the Nore, on the east, are responsible for no fewer than 50,000 deaths among the birds every year. The flight across the channel, which requires from two to four hours, usually takes place during the evening, so that it is always dark when the opposite shore is reached. It has been found that the majority of the birds do not kill themselves, as has been thought, by flying against the thick glass panes that inclose the light, but that they become bewildered by the brilliant light and circle around it until they fall exhausted, afterward dying of cold and exposure on the rocks below.

At one lighthouse experiments have been made with a view to providing racks and perches on which the birds may alight. From these experiments it has been found that the birds will not perch on racks placed above the light, but that they will quickly cease circling and perch on racks that are so placed as to be clearly illuminated by the light. It is expected that all the principal lighthouses and lightships along this coast will be eventually equipped with this kind of bird-saving apparatus.

HOMEMADE AUTOMOBILE PLOW

An old automobile has been changed into a very satisfactory and economical farm tractor by two farmers near Bellefontaine, Ohio. Practically every part of the tractor, except the original 20-hp. car, is homemade, and it plows a deep furrow at the rate of four miles an hour. The plow is supported by a wooden framework built out from the rear of the car and weighted down with an old anvil. It is hung in such a way that it can be raised off the ground by a lever beside the driver. Wooden casings with wide rims are built over the



Homemade Power Plow Made of an Old Automobile

front wheels and the rear wheels of the automobile are removed altogether. In their place is a pair of small sprockets connected by chain to the axle and wheels of an old farm implement placed under the plow framework. The improvised tractor will plow 50 per cent faster than a four-horse team and costs about $1 a day to operate.

CLOTH SHIELDS TO SHADE YOUNG TREES

Huge linen shields, raised high in the air on slender poles, ward off the sun's rays from the young trees in one of the public squares of Berlin, Germany. They look like the scenery of an open-air stage, but they were set

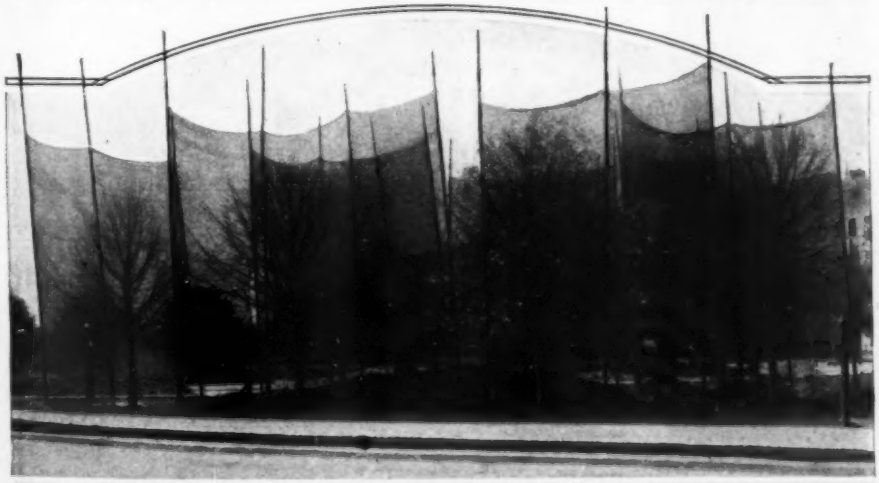


Photo by Paul Thompson

Transplanted Lindens in a Berlin Square Sheltered from the Sun's Rays by Linen Shades

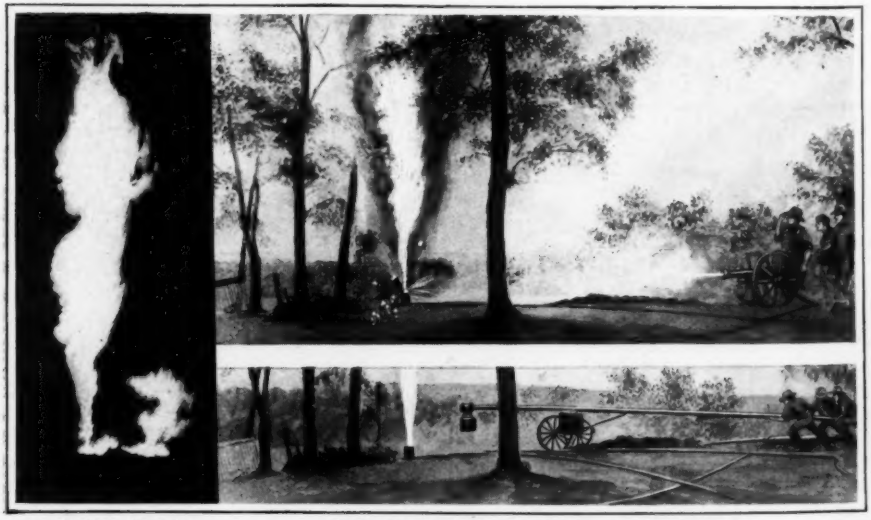
up simply to make a temporary nursery for the young lindens that have been transplanted into Heidelberg Square. The shadeless park has no protection from the hot sun, and until the little trees get a start, they need this artificial shelter to help them grow.

EXTINGUISHING A BURNING GAS WELL

It took a week of hard work to extinguish a burning gas well at Cushing, Okla., which had been accidentally set on fire after running "wild" for over a month. This gas well is one of the biggest producers in the United States, discharging regularly about 40,000,000 cu. ft. per day. When this well had been drilled to a depth of 600 ft., it began to run "wild" and blew off the casing head repeatedly before a secure fastening could be made. The real trouble began when a cowboy, who is expected to recover, thoughtlessly lit a cigarette within about 15 ft. of the powerful gas stream. The gas was ignited, and the resulting blaze, 100 ft. high, could be seen at night for a distance of 50 miles. The flame was finally smothered by means of a swaged nipple on the end of an 8-in. casing, arranged as shown in the illustration. This, when in place, conducted the gas to a safe distance from the flame. The string of casing was backed up to the well on a wagon and the nipple worked into position so that when the wagon burned away the nipple would fall over and close the gas pipe. A battery of six 25-hp. boilers had been rigged up, and steam from these was then used to smother the flame from leaks around the casing. Before beginning this operation the casing head was shot off with a 4-lb. ball fired from an old-style cannon.

NEW TUNNEL LAID UNDER EAST RIVER

Another tunnel under East River, New York City, has been completed. This was built by a gas company to carry gas to the Bronx from its plant. The tunnel is 4,662 ft. long and is nearly 150 ft. below the river bed, at an average depth of 246 ft. below the surface of the water. It is 19.5 ft. wide, 21 ft. high, lined with concrete, and will carry four 6-ft. mains. The tunnel cost about $5,000,000.

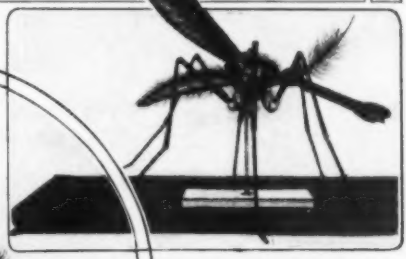


Blaze 100 Ft. High from Burning Gas Well

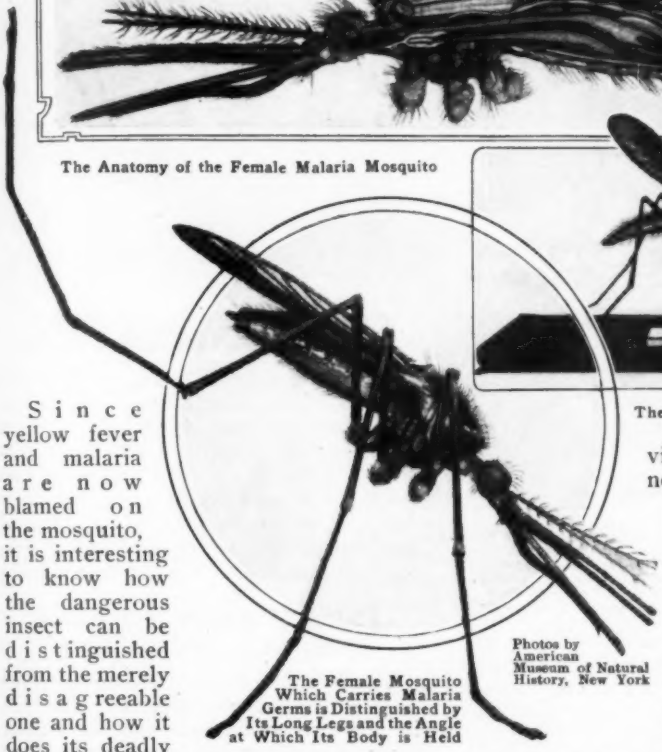
Above: Shooting Off the Heading of a Gas-Well Casing
Below: Casing Mounted on Wagon and Ready to be Dropped over Gas Pipe

ANATOMY OF THE MALARIA MOSQUITO

The Anatomy of the Female Malaria Mosquito



The Harmless Male Mosquito Which does Not Bite



The Female Mosquito Which Carries Malaria Germs is Distinguished by Its Long Legs and the Angle at Which Its Body is Held

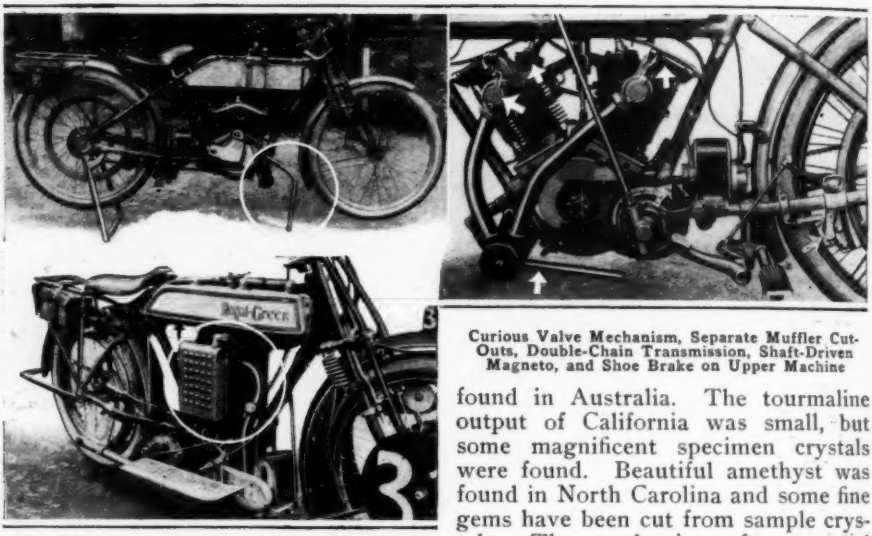
Photos by American Museum of Natural History, New York

Since yellow fever and malaria are now blamed on the mosquito, it is interesting to know how the dangerous insect can be distinguished from the merely disagreeable one and how it does its deadly work. All mosquitoes are not biters and all biting mosquitoes do not carry malaria. Although the male mosquitoes outnumber the female ten to one, only the female feeds on blood. And of all the females, one species alone is to be feared—the malarial mosquito. It can be distinguished by the fact that its hind legs are relatively very long and that it, therefore, holds its body at an angle of 45 deg. while biting or resting. All mosquitoes except the germ-carrying variety rest horizontally. Thus distinguished, certain other characteristics follow. The germ carrier flies only at night and cannot fly more than 100 ft. It is perfectly harmless unless it has had an opportunity to bite a malaria victim, for malaria is not inherent in its nature — it is simply a germ carrier. But if the mosquito obtains any malaria germs while sucking blood, they remain in its stomach, breed myriad other germs, and spread into the salivary glands, ready to be deposited with the saliva at the mosquito's next meal. The bill of a malaria mosquito is so constructed that it leaves a small drop of saliva, in which there may or may not be germs, while blood is being taken in through another duct.

NEW FEATURES ON ENGLISH MOTORCYCLES

Many novel motorcycle improvements and attachments appeared on the machines which took part in the recent Grand Prix race in France. Two interesting English models are shown on the next page. The heavier motorcycle with the sidecar has a water-

cooled engine with a radiator on each side of the single cylinder and most of its machinery is carried below the frame. A folding front-wheel stand and a shoe brake, working on a large drum on the rear wheel, are the most striking features of the lighter two-cylinder machine. Its motor has overhead valves, operated by push tappets and offset levers, and separate muffler cut-outs over each exhaust valve. Two chains are used to connect the engine shaft with the change-speed gears, and the magneto is shaft-driven.



New Motorcycle Features Appearing on Two English Machines Which Took Part in the French Grand Prix Race. Upper: Two-Cylinder Model with Front-Wheel Stand Shown in Circle. Lower: Water-Cooled Motor with Two Radiators and Machinery Below the Frame

Curious Valve Mechanism, Separate Muffler Cut-Outs, Double-Chain Transmission, Shaft-Driven Magneto, and Shoe Brake on Upper Machine

PRECIOUS STONES MINED IN THE UNITED STATES

The principal gem mineral mined in the United States during 1912 was Montana sapphire, according to a recent report issued by the U. S. Geological Survey. Of these there was a large output for use both as gems and in mechanical applications, the majority of the stones being of a true sapphire blue. Opals of an unusual type were found in considerable quantities in Nevada, these gems consisting of dark translucent mineral with a variety of rich colors, and equaling if not exceeding in beauty the opals found in Australia. The tourmaline output of California was small, but some magnificent specimen crystals were found. Beautiful amethyst was found in North Carolina and some fine gems have been cut from sample crystals. The production of agate and associated varieties of chalcedony was large in several of the western states.

FRENCH ARMY TO HAVE ARMORED AEROPLANES

The French military authorities have decided that all aeroplanes to be used in war are to be protected by armor plate, according to an announcement recently made in Paris. This decision is the result of experiments showing that observations can only be made satisfactorily at heights of less than 2,600 ft., a height at which an aeroplane is well within range of land defenses. The French aerial fleet, on the completion of the armored aeroplanes, will comprise one-seat and two-seat aeroplanes, for reconnoissance, and two-seat aeroplanes, having a minimum speed of 75 miles per hour and armed with quick-firing and automatic rifles, for pursuing hostile aeroplanes and dirigibles.

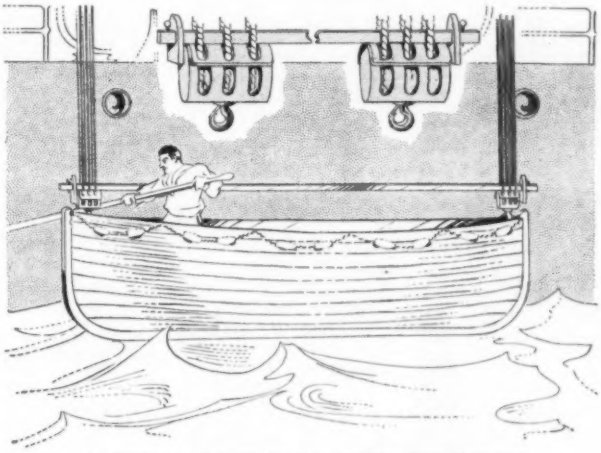
¶Congress has spent $338,828,273.14 on the Panama Canal up to the present time.

DRAWING WIRE OF SMALLEST DIAMETER

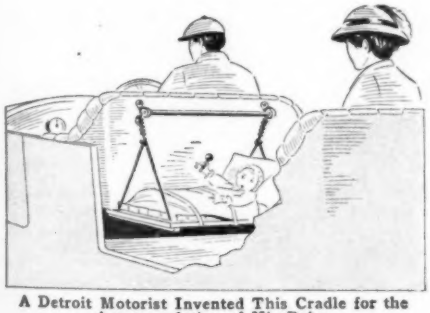
In the Worcester works of the American Steel and Wire Company copper and aluminum wire is drawn to a diameter of .005 of an inch. This is done, not as an experiment, but as a commercial operation. The dies are of diamond, no other material being hard enough to withstand the wear of the wire's forced passage through this diminutive opening. In drawing the wire to this almost gossamer fineness, it is passed through a series of die holes of successively smaller sizes. Piercing the diamond with these minute holes is an operation requiring the most delicate machines. In one case a diamond has been pierced with a hole only .0001 in. in diameter. This hole is so small that it can be seen only with a powerful microscope. Water will not go through a passage of this size, but alcohol under pressure will penetrate it sufficiently to affect chemically prepared paper placed on the opposite side. To drill this opening required seven months, and it was possible to use a drill for only two seconds before it became dull.

DEVICE FOR MAKING BOAT TACKLES TWISTLESS

A device that prevents the tackles from twisting while a lifeboat is being lowered down the side of a ship has been invented by a sea captain of New York. The antitwisting device consists in fitting to each lower block of the tackle a cap having, on each side, three holes through which is passed the rope, as well as through the sheave holes of each lower block—an arrangement which is intended to keep the blocks from capsizing. A wooden scantling of proper length is also passed from one lower block to the other through each tackle, thus preventing both tackles from twisting.



A Device for Preventing Boat Tackles from Twisting



A Detroit Motorist Invented This Cradle for the Accommodation of His Baby

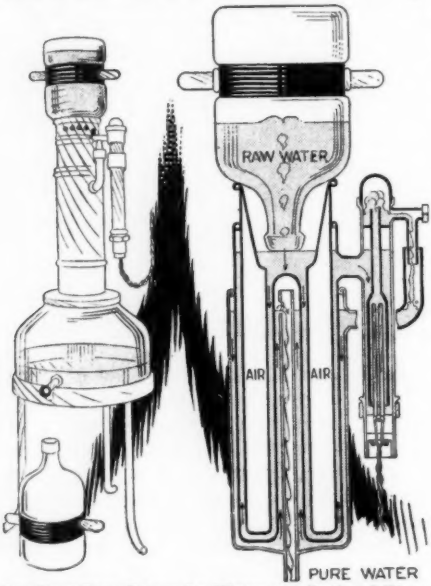
BABY CRADLE FOR USE IN AUTOMOBILE

An exceptionally practical and ingenious cradle arrangement is the invention of a Detroit motorist who, having both an automobile and a baby, sought far and wide for some means of conveniently and comfortably carrying one possession in the other. In the making of the cradle he used two wooden slats, about 30 in. long, two crosspieces, 18 in. long, two tension

springs, a pillow, a mattress, and 8 ft. of heavy cord. The cradle is suspended from the blanket rack on the back of the forward seat and from the left-side door of the tonneau.

WATER STERILIZERS USING GAS OR ELECTRICITY

A water-sterilizing outfit having several interesting features is here shown. It is a combined sterilizer and drinking



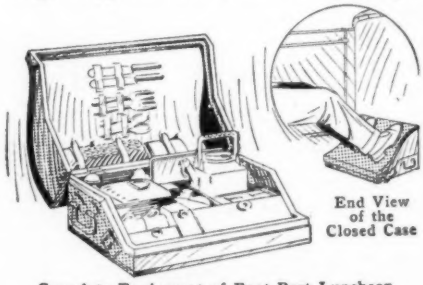
Sterilizer That Brings Ice Water to a Boil and Then Discharges It Nearly as Cool as When It was Received — Sectional View Showing Construction and Action

tank for the office, school room or home. Either electricity or gas may be used for sterilizing the water, the fixture being clearly shown in the illustrations. The most interesting feature of the apparatus is the fact that, even though every drop is raised to the boiling point, the water is discharged at nearly its original temperature. Thus cool, cold or even ice water may be supplied to the sterilizer and be discharged practically as cold as on entering, and without the use of chemicals or refrigerants.

The water to be sterilized flows from the inverted bottle into a feed cup, and then down between an outside and middle tube, entering the heater at the lower end of a fountain tube, in which it rises until its level, as well as that in the feed cup, reaches and seals the mouth of the bottle. No more water can now run out of the inverted bottle because, its mouth being sealed, no air can enter it. When the electric current, or gas burner, as the case may be, is turned on, the heat causes the water under the flared end of the fountain tube to boil and geyser upward out of the top of the tube. As the cold water passes to the heater it is continually coming in contact with a surface on the opposite side of which is the hot water finding its way to the sterile water tank at the bottom of the apparatus. The cold unsterilized water is thus continually absorbing the heat from the hot sterilized water. By the time the unsterilized water enters the heater it is thus brought nearly to the boiling point, and, conversely, the hot sterile water leaving the heater is discharged nearly as cold as when it left the bottle at the top of the apparatus.

FOOT-REST LUNCHEON CASE FOR AUTOISTS

A completely equipped luncheon case that can be used as a foot rest in an automobile is one of the many handy outfits recently brought out in England for motor picnickers. The foot-rest luncheon box shown in the picture is designed for two persons and is 18 in. long, 11½ in. wide, and 10 in. high.



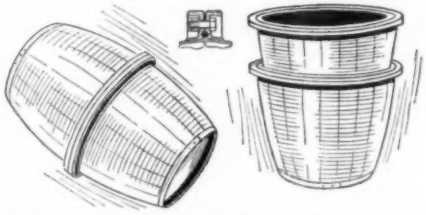
Complete Equipment of Foot-Rest Luncheon Case for Automobilists

Larger sizes are made for four or six persons. The box is dust-proof and has

a corrugated rubber top and brass handles and lock. Every requisite for a complete luncheon is neatly packed inside.

STEEL BARRELS MADE TO BE NESTED COMPACTLY

A new and ingenious type of steel barrel so designed as to permit compact storage when shipped empty has been placed on the market. The chief feature about this barrel is that it is made in halves that are exactly similar, with flanges provided so that any two halves can be bolted together to form a complete barrel. In the shipping world bulky articles like barrels, when shipped empty, are charged at bulk tonnage rates. Barrels of this

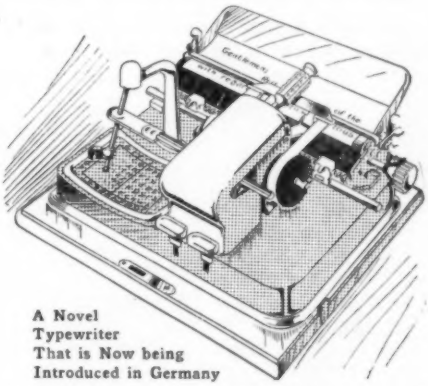


These Barrels are Made in Halves, Which are Bolted Together through the Flanges

type, when nested compactly, will be entitled to weight rates, reducing the shipping charges materially. This invention brings to mind the fact that in the old days of the whaling industry ships were often compelled to put to sea without proper ballast because of the fact that all the available space was occupied by empty barrels.

NOVEL TYPEWRITER USED IN GERMANY

The typewriter shown in the illustration, which is now being introduced in Germany, will appear strange and probably impractical to the users of standard American machines. A mechanism within the casing, which is controlled by the vertical rod over the keyboard, operates the type cylinder, shifting or rotating it into position for striking the letter. In operation the vertical rod is shifted with the left hand over each letter, as required, and

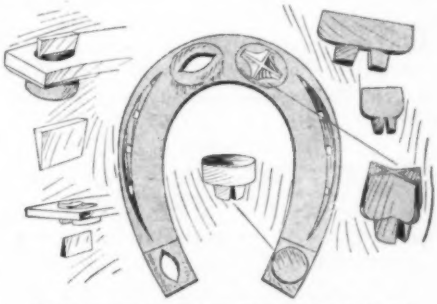


A Novel Typewriter That is Now being Introduced in Germany

the letter is struck with the right hand by means of one of the keys at the front of the machine.

HORSESHOE HAS REMOVABLE CALKS

A new type of horseshoe recently invented has calks that are easily placed and that fall out of the shoe when nearly worn out. The calks have prongs that are a trifle too large for the opening in the shoe, as shown in the illustration, and have to be driven in. As the tread of the calk wears down, the spring action of the prong is weakened and it finally falls out or



When Nearly Worn Out These Calks Fall Out, Leaving Opening Ready for Insertion of New Calk

becomes so loose that it may be picked out easily, leaving the opening ready for the insertion of a new calk.

NESTING A FEATURE OF NEW LIFEBOAT

A steel lifeboat made with an inner and an outer hull and so shaped that it will nest compactly with other boats

Steel Lifeboat with Inner and Outer Hulls

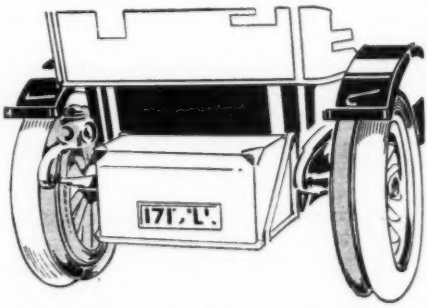
is one of the latest improvements in life-saving equipment. The two hulls are spaced apart by steel ribs formed of channel iron, which serve to increase the strength and rigidity of the boat, while the air spaces inclosed by these ribs and the hulls serve to increase its buoyancy. The seats are supported in openings made in the inner hull and are easily removed, making it possible to nest the boats in groups of four or more.

THE ACTION OF SEA WATER UPON CONCRETE

The ability of concrete to resist the disintegrating action of salt water has been the subject of a series of tests extending over several years at the field laboratory of the U. S. Bureau of Standards at Atlantic City, N. J., and some of the conclusions have recently been published. The problem of marine construction, as the tests show, is one of method rather than of materials; if concrete can be placed in the forms without undue exposure to sea water, it sets and hardens as well in sea water as in fresh water or in the air. No apparent relation seems to exist between the chemical composition of a cement and the rapidity with which it reacts in sea water. Portland-cement mortar or concrete, if porous, is disintegrated by salt, if crystals are allowed to form during drying. In the case of hydraulic cement, field experiments seem to indicate that the lime on the surface carbonizes and forms a protective coating. When totally immersed, properly made Portland-cement concrete is apparently not subject to decomposition in sea water; whether or not it decomposes when placed between tides has not been determined, but the tests indicate that it does not.

COMBINING PNEUMATIC AND SOLID AUTO TIRES

A new type of double automobile wheel, arousing considerable interest in France, combines the pneumatic and the solid tire. The outer wheel, on which the car runs under ordinary conditions, is pneumatic-tired. When there is a slight overload, however, or the pneumatic tires are not sufficiently inflated, the inner wheel, which carries

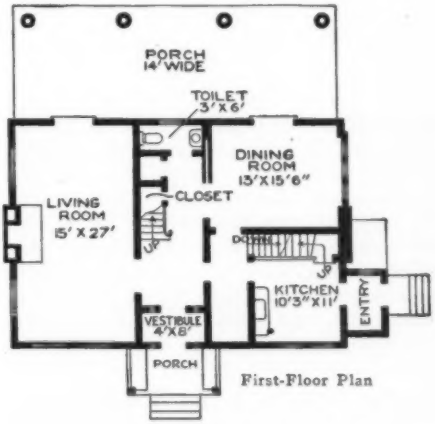


Double Automobile Wheels; The Outer Wheel Carrying a Pneumatic and the Inner a Solid Tire

a solid rubber tire, comes into action. The solid-tired inner wheel is particularly useful when the pneumatic tires are punctured or blow out.

A DWELLING OF THE DUTCH COLONIAL TYPE

Second-Floor Plan



First-Floor Plan

Temple & Burrows, Architects, Davenport, Iowa

In this seven-room dwelling, which is designed to be set at or near the street line, the ideals of the Dutch Colonial type of dwelling are carried out. The kitchen is so placed that it is never necessary for tradesmen to go beyond the side entrance, and the whole arrangement is such as to provide privacy and attractiveness at the rear of the house, where there is a living porch overlooking the private grounds. This building is of frame construction with shingled exterior, has concrete foundations and basement walls, and cost $6,100.

¶Iron alloyed with gold is being introduced as a substitute for tin in the making of cans. The resulting product is proof against corrosion of most kinds, but costs 15 times as much as tin plate.

DRINKING FOUNTAIN USED LIKE A CUP

A sanitary drinking fountain which does not force the drinker to stoop over and gulp the water upside down has

One can Drink from This "Bubble" Fountain without Stooping

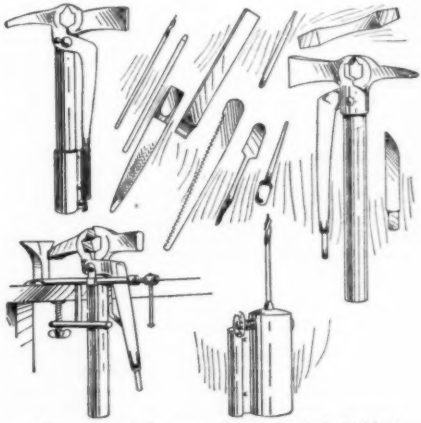
been patented recently. In this "bubble" fountain the water jet, instead of being fixed permanently in the center of the bowl, is attached to the end of a flexible tube so that it can be raised up to the mouth like a cup while the drinker stands erect. When not in use, the water jet stands in the center of the bowl and the hose is hidden inside the fountain.

PEAT POWDER AS FUEL FOR LOCOMOTIVES

Powdered peat, which is now being introduced on the market as a substitute for coal, seems to be giving excellent satisfaction as a fuel for locomotives. The powder is fed by an automatic process into the fire box of the locomotive, which is specially arranged to consume it. Tests show that 1½ tons of this powder, which is burned with an admixture of five per cent of coal, is equivalent to one ton of coal. There is no difficulty in bringing the powder from the tender, as it passes automatically through a feed pipe into the fire box. Among the advantages claimed for peat powder is the fact that no cold air can get into the fire box and that no sparks or smoke are thrown from the stack. The development of this fuel, which is being promoted by a Swedish engineer, is awakening an interest in the utilization of the extensive peat bogs of Sweden.

MANY TOOLS COMBINED WITH HAMMER

A whole cabinet of tools, including vise, cutting plier, wrench, and hammer, along with the numerous small tools usually included in combination tool sets—all part of the hammer, or nested in the hammer handle—is a novelty from France. The hammer head may be used as either a vise, a cutting plier or a wrench. The sleeve, which holds the end of the hammer handle and the other leg of the tong together when the tool is being used



Hammer and Contents Form a Whole Cabinet of Tools

as a hammer, serves, when removed, as a handle for the small tools. A small anvil is also provided with the outfit, for use in connection with the vise.

BAYONETS USED IN FOREST TELEPHONE SERVICE

Army bayonets have been converted into instruments of peace by the United States Forest Service to form a part of the hand-telephone equipment of the forest rangers. It has been found that a bayonet thrust into the ground makes an excellent return connection for the single-wire telephone lines built through the national preserves for the sending of orders and reporting of forest fires. To call headquarters the ranger thrusts his bayonet into a moist spot of ground and throws a bare wire over the nearest telephone wire; this completes the circuit.

POCKET ELECTRIC LAMP HAS DYNAMO

Instead of the customary dry battery, this ingenious pocket electric-flash lamp is provided with a little dynamo which is driven by a spring motor. The lamp can be made to give a continuous light by simply depressing a lever at regular intervals of about three or four seconds, the action of the lever simultaneously releasing and rewinding the spring. The lamp is 5½ in. long by 1¾ in. in diameter.

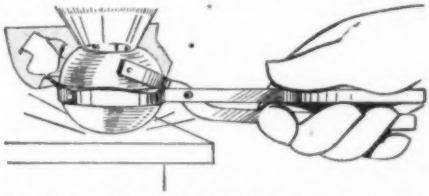
HOW INDIANS MAKE FLINT ARROW HEADS

The old Indian art of making flint arrow heads was not so difficult as is usually imagined—white men are making "old and genuine" Indian arrow heads now for commercial purposes and by the old Indian methods. Flint is not chipped with stone or with metal, but with water. When an Indian wished to make an arrow head, he held a piece of flint in a fire until it was very hot and then allowed a drop of water to drip from the end of a stick upon the spot to be chipped away. The sudden cooling made the flint chip off immediately. Some cunning is of course necessary in the shaping of the arrow head, but the old Indian method is the best that has been found.

An Indian Using Fire and Water to Shape a Piece of Flint into an Arrow Head

TOY PISTOLS USE PAPER AS AMMUNITION

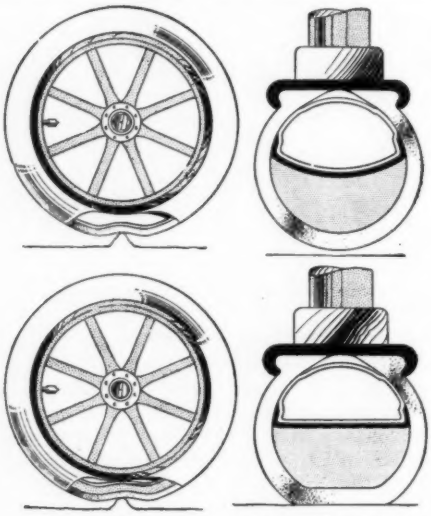
Nearly every American father has, at one time or another, blown up a paper bag and then exploded it by striking the bottom with his hand, to the great enjoyment of a small son. The illustration shows a safe noise-making toy embodying the same idea. A piece of old newspaper is the ammunition. This is slipped over the opening of the ball or bowl-shaped receptacle, and the pulling of the trigger or exertion of pressure on the handle, results in a pressure of air which bursts the paper with considerable noise.



Safe Noise-Making Toy Embodying a Familiar Idea

PUNCTURELESS AIR CUSHION FOR MOTOR-CAR TIRES

A punctureless cushion that can readily be applied to any kind of rim or tire, and which is claimed to make



Above: How a Tire without Air Cushion is Punctured
Below: How Air Cushion Prevents Rupture of Tire

Above: Shape of Air Cushion When Tire is Off Road
Below: Deflection of Air Cushion When Tire Rests on Road

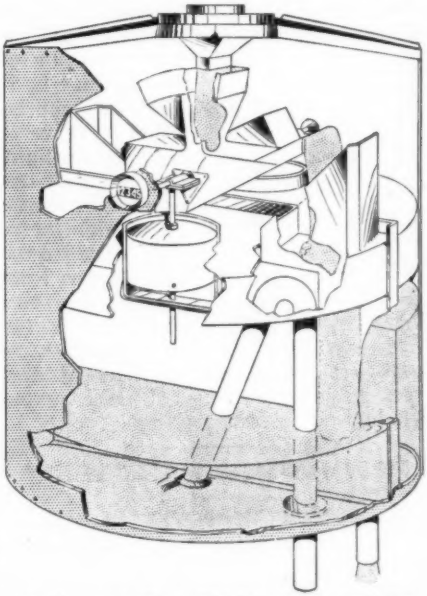
automobile tires entirely puncture-proof, is composed of a rubber substitute, made of vulcanized vegetable oil, placed between the wearing surface of the tire and the tube containing the air.

THE BREEDING OF FOXES FOR THEIR SKINS

The business of rearing foxes for their fur is to receive an impetus by the proposal of the Secretary of Commerce to lease to Americans 12 islands on the coast of Alaska for this purpose. The trade in fox furs has netted the government large sums during recent years, and it is expected that the industry can be greatly improved by the application of up-to-date methods of animal breeding—that is, by the development of pure strains of the valuable blue, silver-gray, and black foxes, and the elimination of white foxes. On the Pribilof Islands, which are to be leased for this purpose, foxes are reared on waste seal meat, fresh and salted fish. As fox pelts taken from these islands sometimes bring as much as $131 each in London, the industry is a profitable one and the Secretary of Commerce has undertaken to furnish live blue foxes of the purest breed to develop it.

SIPHON ACTION USED IN MEASURING WATER

The water weigher shown in the illustration has two compartments, each emptied by a siphon. Water enters through the inlet to the tipping box, where a small portion is intercepted, the remainder passing to the measuring compartment below. When the compartment is nearly filled the float tilts the tipping box, spilling the contents into the compartment. This



An Automatic Water-Weighing Device That Has No Valves or Pistons

completes the charge and starts the siphon. One compartment empties as the other is filled. A counter registers each double charge.

How the New Wireless Law Works

By George F. Worts
LICENSED OPERATOR - FIRST GRADE

THE confusion in wireless-telegraph circles resulting from the rigid enforcement of the new "wireless law," which requires all wireless stations and all wireless operators to be licensed, has to a considerable extent subsided, so that it is now possible to describe the results of the law with a reasonable degree of accuracy. Federal wireless regulation was an iron long in the fire before it was extracted and molded into its present form. When it came it was a pill without any sugar coating. Congress has an unpleasant way of saying "must" and not "may." But the medicine seems to have done the wireless system of the United States a world of good, even in the short time that it has been tried. Eleven officials in nine districts, armed with the formidable title of "Federal Radio Inspector," are administering generous doses according to the nature of the case by the following plan:

Amateur stations are restricted to a transmitting-wave length of 200 meters (656 ft.), "tuned sharp," and a transformer input of one kilowatt. In the case of stations within five miles of naval or military stations, the current input must be still further reduced to ½ kilowatt. Amateurs with two years of actual experience can obtain a special amateur-station license from the Secretary of Commerce to use a longer wave and a higher power. This grade of license is difficult to obtain, however, because the applicant must prove conclusively that a "substantial benefit to the art or to commerce" is likely to result; in other words, that his motive is not merely one of individual amusement.

At the Berlin convention—a meeting of the world powers held several years ago to arbitrate wireless questions of an international nature—it was decided that commercial stations the world over should use two wave lengths: 300 and 600 meters (984 and 1,968 ft.), respectively. Each government, however, may authorize the use of a wave exceeding 1,600 meters (5,248 ft.) for long-distance transmission, as it is exceedingly difficult for high-powered stations to operate efficiently on short wave lengths. But the limits of 600 to 1,600 meters must not be trespassed upon, as wave lengths within that range are reserved for government stations exclusively. Shipboard stations, as far as possible, must operate on a normal wave length of 300 meters, "tuned sharp," to minimize interference. In case a distress signal is to be sent out, the apparatus is adjusted coarsely, so that it can be readily heard whether the desired receiving station is tuned for 300-meter waves or not.

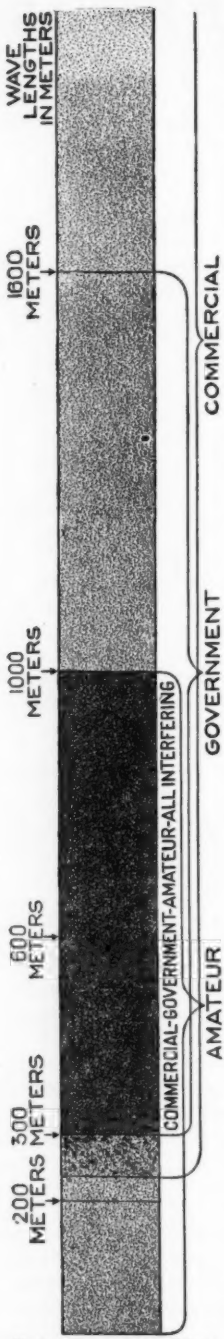
Only two classes of stations are totally exempt from license: First, those whose apparatus is for receiving only; second, those whose influence does not extend beyond the state, or does not interfere with the reception of radiograms from beyond the state.

According to the new law, there are nine different, distinct grades of wireless operators, and they are classified as follows:

Commercial	Amateur	Technical
1, First Grade	6, First Grade	8, Experimental Grade
2, Second Grade	7, Second Grade	9, Instructor Grade
3, Cargo Grade		
4, Extra Grade		
5, Temporary Permit		

The severity of the examination for commercial operators has very effectively weeded out the "bluffers," and, it is reported, a noticeably increased operating standard is already the gratifying result.

In order to secure a first-grade commercial license the operator must be able to receive and send at least 20 words a minute in Continental-Morse—the international code—counting five letters to the word. Some of the inspectors require the applicant to receive in a foreign language, thereby absolutely assuring his accuracy. A single wrong letter in a word spoils an applicant's chance for a license, although, of course, he may take the examination



Under Former Conditions

over again at some other time. Next comes a written test covering wireless theory, adjustment and care of apparatus, knowledge of the Berlin Regulations and Radio Acts of Congress. Such practical puzzlers are often given as: "What would you do to replace it, if the starting box of the motor-generator burned out?" Or, "How would you erect and insulate an aerial, in case yours blew overboard?"

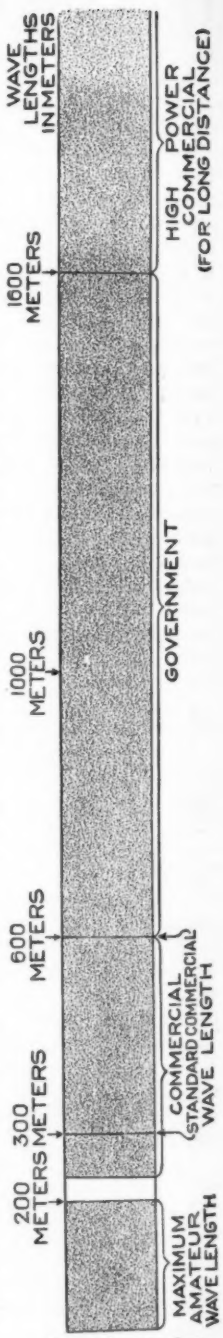
Finally comes a test in adjustment for different wave lengths and correction of faults. A first-class commercial license qualifies the holder, if a man, for employment at any ship or shore station, or if a woman, for shore-station work. It might be mentioned in passing that very few licenses of any grade have been issued to women.

To gain a second-class license requires a knowledge of theory and apparatus less extensive than is necessary for first-class, and a sending and receiving ability of only 12 words a minute. Second-class operators are usually employed as "assistants" or "juniors" in ship and shore stations.

Cargo-grade licenses are issued in lieu of second-class for assistant operators on cargo vessels. Cargo-grade operators are usually members of the crew.

Temporary licenses, as the name suggests, are issued in cases of emergency, and are valid for one voyage only. The necessity of a provision of this nature can be appreciated when it is explained that a heavy fine is imposed upon the master of a vessel clearing port without an operator.

The highest grade of license obtainable is known as "extra-grade" and is issued only to operators whose first-class licenses, indorsed by the proper authority, record 12 months of satisfactory ocean service, and who can pass a special examination. The United States government plans to use these men in its own service.



Under the New Law

The requirements for an amateur's license of either first or second grade are just the same, the distinction lying in the ability of the former to appear before the inspector for examination. Either must have a knowledge of the Berlin Regulations, adjustment of apparatus and ability to send and receive Continental-Morse, no speed being stipulated. The second-class license is sometimes granted as a temporary permit until the inspector has the time or opportunity to give the examination. Its real purpose, however, is to provide for the amateurs who, although unable to see the inspector personally, can satisfy him in writing of their sincerity and knowledge of the required subjects.

Experimental and instruction-grade licenses are merely special permits attached to first-grade commercial licenses.

The radio inspectors as a rule have had little trouble in enforcing the law, their most common complaint being the surprising lack of knowledge of former professional operators applying for commercial licenses. About 5,000 licenses of the different grades have been issued so far, the amateurs, of course, claiming the majority.

One inspector, at least, took advantage of his privilege of enlisting the aid of police power to enforce his authority, when he was assaulted and beaten one night by indignant amateurs while trying to persuade them to comply with the 200-meter rule. Several nights in jail sufficed to impress upon them the majesty of the wireless law; and the publicity given the affair by the local press has made that particular district one of the most orderly of the nine.

Federal radio inspectors are stationed at Boston, New York, Baltimore, Savannah, New Orleans, San Francisco, Seattle, Cleveland and Chicago, and, as a rule, are glad to furnish information to amateurs and others seeking license.

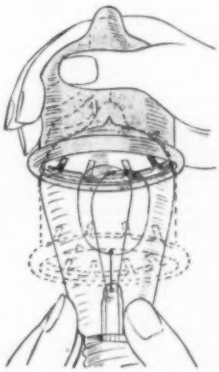
CAMPAIGN TO EXTERMINATE PRAIRIE DOGS

War against the prairie dogs on the sheep and cattle ranges of the West is being waged by the Biological Survey of the Department of Agriculture. About 277,000 acres of range, sufficient to support 6,950 cattle or 55,600 sheep, made worthless by the little pests, have now been restored to usefulness. Although the survey usually works to prevent the extinction of birds and animals, it justifies this campaign on the same grounds as the war against the bubonic-plague rat and squirrel and the tree-girdling rabbit. Poisoned grain is used to kill the pests.

¶ Consumers are warned by the Department of Agriculture to wash celery stalks thoroughly before they are eaten, to remove the slight deposits of lime and sulphate of copper sometimes caused by the necessary spraying of the plant.

COLOR-CHANGING HOODS FOR ELECTRIC-SIGN LAMPS

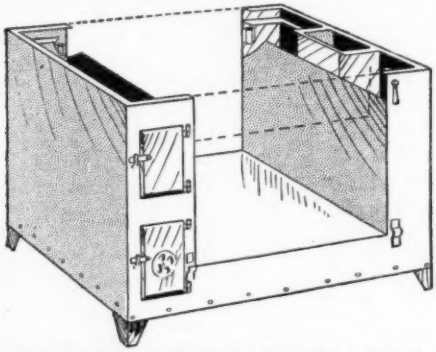
Hoods or cups made of colored glass, such as ruby, amber, green, opal, blue and frosted, designed to be easily slipped over the ordinary electric bulb, provide an ingenious, practical means of changing the color schemes and effects of electric signs and displays. The hoods are held firmly in place over the lamp bulbs by means of spring clips.



¶ In 1911, the Irish depositors had the highest average deposits and the Scotch depositors the lowest in the British Postoffice Savings Bank.

COLLAPSIBLE RANGE FOR CAMPING TRIPS

A cook range that can be taken apart and packed compactly for transport, has been placed on the market,

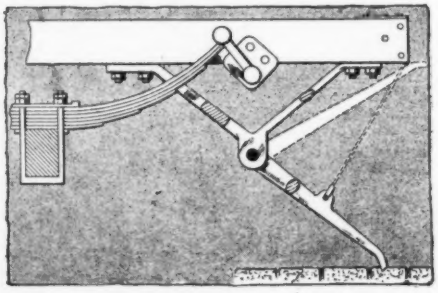


Cook Range That can be Taken Apart and Packed Compactly for Transport

and is designed particularly for use on camping trips in mountainous country, or under other conditions where transportation facilities are limited. The range consists of a U-shaped casing, the sides of which are formed with inner and outer sheet-iron walls and are open at the top. All oven parts are removable, while the top, bottom, and sides are so connected that they can easily be taken apart and set up again.

WAGON SPRAG FOUND USEFUL FOR MOTOR TRUCKS

There are several cities in the United States where the hills are sufficiently steep to warrant the fitting to heavy



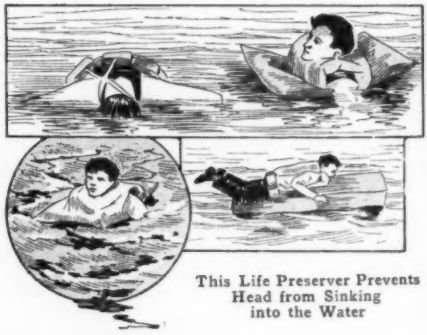
The Sprag of the Farmer's Wagon Finds a Welcome on Motor Trucks in Hilly Cities

motor trucks of the sprag which the farmer, in particular, has always depended upon to keep his wagon from rolling back downhill, when the horses tired and required a minute or two of rest.

The extent to which motor trucks are equipped with sprags is much greater in Europe than in this country.

LIFE PRESERVER SHAPED LIKE PILLOW

A life preserver has been invented which is designed to provide buoyancy at the head and shoulders and to make a person secure against drowning when exhausted or unconscious, the time when such protection is most needed. This is accomplished by making the life preserver so that it will spread out like a pillow, supporting the body directly under the armpits, and preventing the head from sinking into the water in case the user becomes un-

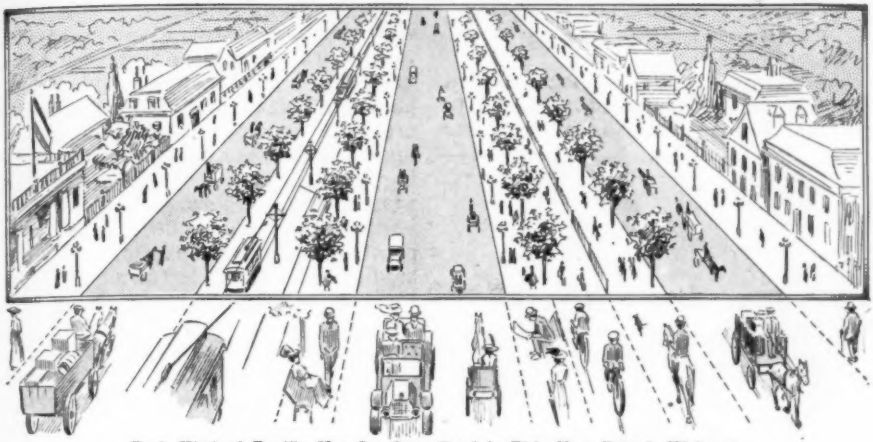


This Life Preserver Prevents Head from Sinking into the Water

conscious. Lightness, strength, long floating ability, and ease of putting on are provided in this device.

FRENCH HIGHWAY DESIGNED FOR SAFETY

A street with separate roadways for every kind of city traffic is being constructed along the Lille-Roubaix highway in France to decrease the number of traffic accidents. Although this road is unique in the extent to which the idea is carried out, it is merely an amplification of the plan used in the



Each Kind of Traffic Has Its Own Road in This New French Highway

Avenue des Champs Elysees, Paris, and in the boulevards of some American cities. The new highway is divided into 10 separate roads or paths and each one has the kind of pavement best fitted for its traffic. The broad drive down the center, lined with lamp-posts, is intended for automobiles and other fast-moving vehicles. On either side of it is a walk for pedestrians with benches under shade trees. On one side of this central section is a double-track trolley line between two rows of trees; on the other side are paths for cyclists and horseback riders separated by a fence and shaded by two more rows of trees. The outside roads on either side are for carts and other heavy, slow-moving vehicles, and lighted walks for pedestrians separate these from the bordering buildings. Such a division of traffic, it is hoped, will do the work of a large "traffic squad."

NEW TANDEM SEAT FOR MOTORCYCLES

Motorcyclists will be able to insure the comfort of their passengers by means of a new tandem seat that has been placed on the market. Besides the usual vertical shock-absorbing springs this seat is provided with springs which absorb the horizontal shocks, so that the machine may be driven over rough roads without any shocks being felt on the tandem. All springs are inclosed in tubes, the cushions are provided with skirt guards and side pockets, and the foot rests are so constructed that they fold flat when not in use. The seat is also provided with a back rest that can be lowered instantly while riding, in case it becomes necessary to dismount quickly.

New Motorcycle Seat with Springs That Absorb Both Vertical and Horizontal Road Shocks

¶The roof garden of a New York hotel has a glass roof over which flows a cascade of water, which, with a special light arrangement, produces the illusion of dining under water.

WRIST PURSES FOR PAY-AS-YOU-ENTER FARES

About the handiest device designed for the shopping woman who has to pay her fare on entering a street car

Convenient Wrist Purse f:r Car Fare, Etc.

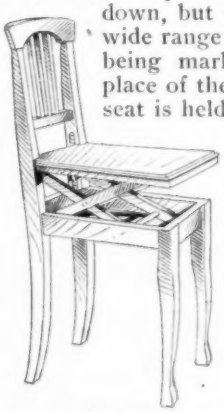
is the little wrist purse here shown. It is designed like the wrist watch, and straps around the left wrist in such a position that it is a simple matter to unsnap the lip and extract a nickel with the right hand, no matter how many bundles are being carried under the arms.

SANITARY CONDITIONS IN MINING TOWNS

Just how much insanitary conditions have to do with the death rate of miners, through diseases or accident, is to be studied by the recently organized Mine Sanitation Section of the U. S. Bureau of Mines, with a view to the betterment of living conditions in mining towns. The bureau will reach the mine workers through illustrated lectures, moving pictures, and pictorial circulars, and will assist the managers by studying conditions and outlining improvements. The chief difficulty in improving mining towns results from the facts that each town is built at a stroke by the mining company and that the individual householders have no pride in their surroundings. But the method of building mining towns easily lends itself, for the same reason, to thorough and sweeping improvement when the necessity is pointed out, since the employer is the landlord of the whole town. Satisfactory water supply is one of the first questions to be treated. Because the private wells drilled in mining towns are ordinarily polluted, it is thought that the distribution of pure drinking water from a common source, the establishment of public laundries and public bath houses at the mine shafts and at the schools will be of great benefit. Sewage systems will also be studied; the installation of a sewage-disposal plant, it is thought, will be the only solution for the sewage problem in these hilly towns. In spite of the utter lack of civic pride and the extreme ignorance of the inhabitants, a great improvement in sanitary conditions and health is expected from the movement.

PIANO CHAIR WITH ADJUSTABLE SEAT

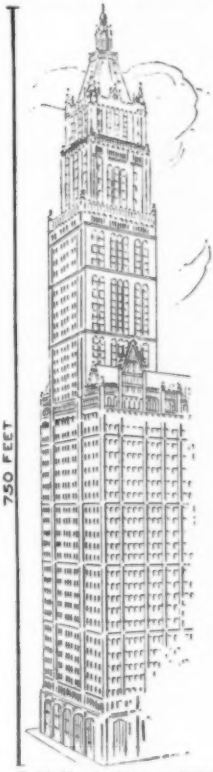
An article of furniture which looks like an ordinary chair when its seat is down, but which has quite a wide range of adjustability, is being marketed to take the place of the piano stool. The seat is held in position at the height desired by a pawl-and-ratchet mechanism on the inside of the uprights of the chair's back. The chair is also practical for restaurants, schools and other places where chairs of adjustable height are desirable or necessary.



ENORMOUS ANNUAL OUTPUT OF GOLD

The annual production of gold is now nearly five times as great as in 1887, when the Witwatersrand, in South Africa, the greatest gold field in the world, was opened. When it is considered that a nugget of gold weighing a pound, which would be about the size of an egg, is worth over $300, the amount of gold dug out of the earth each year is truly enormous. In 1911, the total production amounted to 785 short tons, valued at over $472,000,000. If all the gold produced in that year could be collected and made into a slender shaft, 1 ft. thick and 1 ft. 9 in. wide, it would reach from street level to the top of the Woolworth tower, which is a trifle over 750 ft. high, while a train composed of 16 cars, each having a capacity of 50 tons, would be required for transporting the gold to the site. In addition to this a foundation similar to that of the Woolworth building would be required for supporting this enormous concentrated weight. Of this, 36 per cent, or 283 tons, valued at about $170,000,000, was produced in the Transvaal. The United States comes second on the list with a production of 159 tons, valued at a little more than $96,000,000, while Australasia comes third, with a production of 101 tons, valued at $61,000,000. In comparison with these figures the production of other countries is relatively small. In the 25 years from 1887 to 1911 the production in the Rand alone amounted to about 2,500 short tons, valued at over $1,500,000,000. A train consisting of 50 cars, each having a capacity of 50 tons, would be required for hauling this output. As an indication that the known supply of gold is nowhere near exhausted, it is estimated that the main reef of the Witwatersrand alone still holds something like $12,500,000,000 worth of this metal.

Diagram Showing the Relative Gold Production of Different Countries in 1911



Gold Production of 1911 would Make a Shaft 1 Ft. Thick and 1 Ft. 9 In. Wide, Reaching to the Top of the Woolworth Tower, New York City

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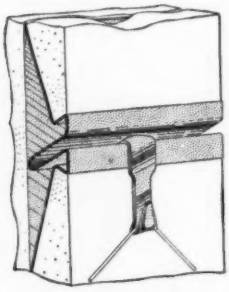
¶A recently invented device for detecting the presence of icebergs consists simply of a flexible strip of material that deflects under a sudden change of temperature and causes an alarm bell to ring.

Train of 16 Cars Required for Hauling the 785-Ton Output of Gold for 1911

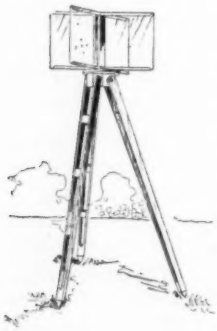
PICTURE MOLDING MADE OF METAL

This style of picture molding is made of galvanized sheet metal, instead of wood, and is intended to be nailed in position before the plaster is applied, thus bringing the molding on a level with the surface of the wall, instead of extending beyond it, and providing a stronger support for heavy pictures. If desired, this type of molding can be made invisible by decorating it the same as the wall, or it may be finished in some contrasting color to create an attractive effect.



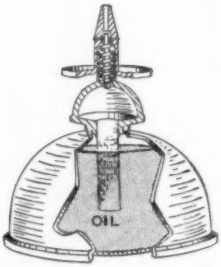
DEVICE FOR STUDYING THE FLIGHT OF MOSQUITOES

A device that shows the direction of flight of mosquitoes is now in use on the Isthmus of Panama and is expected to be of great assistance in locating the breeding places of these insects, as well as in determining the relative numbers of the different species. This device consists of a metal frame holding four plates of glass, each 12 by 12 in., supported on a tripod. The glass plates are held stationary at right angles to each other and the instrument is set up in such a way that the plates point north, east, south and west. To catch the mosquitoes the plates are coated with a sticky mixture of rosin and castor oil, which is practically transparent. In finding breeding places the instrument is useful in eliminating the areas facing the glass surfaces that do not show a catch. It is designed mainly for use at night when the flight of the mosquitoes cannot be seen.



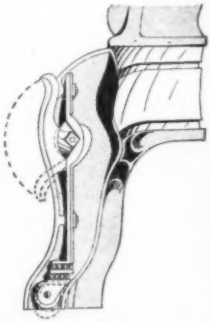
NONEXPLOSIVE CAN FOR PRIMING AUTO ENGINES

A special nonexplosive gasoline can, for use in priming the automobile or motorboat engine, has made its appearance on the market. When priming is necessary, the nozzle is placed in the priming cup and the can pressed downward. This forces the nozzle farther into the cup and at the same time opens a small globe valve, which allows the gasoline to flow. When sufficient gasoline has passed, the nozzle is lifted out of the priming cup, and the valve automatically closes. The can, which holds 1 pt., is thus never left open, and can be kept in a tool box for months without evaporation of its contents.



USEFUL ATTACHMENT FOR STOVE LEGS

A lifting device by means of which the legs of a stove may be raised and the latter moved over the floor upon casters is being manufactured. A lever projects through the front of each stove leg and, by pressing the foot upon the lever, the stove is raised high enough to rest wholly upon the casters, which are ball-bearing, and can be easily moved in any direction.



A MOTORCYCLE HEALTH CRUSADE

Crusaders against the White Plague Who are Using Motorcycles in a Rural Campaign in Wisconsin

Motorcycles are used in the rural campaign against the white plague which the Wisconsin Anti-Tuberculosis Society carries on in the summer. The work consists in placarding the country with health signs and giving talks at creameries, cross roads, and villages. Evening lectures in the villages are illustrated with stereopticon pictures thrown from a lantern on the luggage carrier of the motorcycle connected with the gas tank which supplies the headlight. Two health crusaders, a lecturer and an assistant, work together, riding on the same motorcycle, sleeping out of doors, and doing their own cooking with an outfit carried on the machine. In eliminating hotel bills and delay caused by train schedules, the motorcycle is reducing the cost of the campaign and increasing its effectiveness. Two photographs of health crusaders are shown here.

FIREMAN'S HELMET CARRIES ELECTRIC LIGHT

The fire brigade of Southampton, England, is to be supplied with helmets carrying an electric light, as shown in the illustration. The idea was originated by a young shoemaker, who is an auxiliary member of the brigade. The battery for supplying the current is fixed in the cone of the helmet, and the light can be switched on and off at will.

A FLOATING FLAT TO BEAT THE LANDLORD

By HARRY D. BARTLON

This is the story of my "floating flat" which I built to beat the high cost of living. For over a year, my wife and baby and I have lived in it and traveled in it and saved money as never before, for we have no rent, taxes, gas, water or light bills—nothing but food, clothing, gasoline, and amusements to pay for. We have been happy and healthy.

My floating flat is a 28-ft. cabin motorboat fitted up for a home. We built it a year ago to live in during the summer, but when the season closed we could not bear to leave it. It cost us less than $1,000, two years' rent, and we have traveled 4,000 miles in it.

When we decided to build our floating flat, I took my plans to various boat yards and secured prices. I wanted a boat with sleeping accommodations for six persons, electric lights, power, bath, toilet, and cooking equipment. I finally found a contractor who would build the hull with gasoline tank, rudder and steering wheel, painted and finished, for $275. Then I bought a 30-hp. engine with magneto, clutch, propeller, etc., for $375. For lights I purchased a storage battery for $75 and we recharge it on the way. The equipment of bell, lights, whistle, fire extinguisher and life preservers, which the government requires, cost $30.

For beds we copied Pullman berths. The sides of the berths can be raised and fastened to the ceiling, one above the other, and for mattresses we made imitation leather cushions stuffed with moss. They cost us $65. A plumber installed the toilet for $16. Our folding bathtub was made out of a frame of brass rods and a piece of canvas 8 ft. square. Hot water is supplied from the intake on the engine and the drain runs into the bilge to be pumped overboard by the engine. The folding tub, waterproofed with paraffin, cost $19 and a day's work. Our dishes, kitchenware, etc., were taken from home and we cook on a two-burner gasoline stove with alcohol generator.

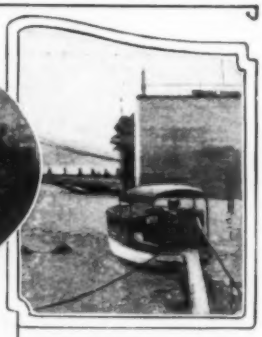
While we lived on the boat we visited neighboring cities and I commuted to Chicago to my work as foreman in a large job-printing office. When cool weather approached, we decided to go to Louisiana with some friends. We were at Hammond, Ind., then, and made the trip to Chicago, 12 miles, safely through rough water. Our route took us down through the Illinois and Michigan Canal and the Illinois River, then down the Mississippi. At St. Louis, Memphis, Baton Rouge, and New Orleans, I worked at my trade and at Cairo, Vicksburg, Natchez, and other cities, we visited friends or looked around. We reached New Orleans on Dec. 14, just ahead of the cold weather all the way down. I found a harbor for our home, a position for myself, and a school for the baby, and we tied up there for the winter. Now we are going to travel in our floating flat "Thelma," back up the Mississippi and Ohio to Pittsburgh, visiting the flooded cities on the way. Then we shall ship her to North Tonawanda, N. Y., and visit cities in New York State and along Lake Erie on our way back through the Great Lakes to Chicago.

Our floating home is a pleasant one and we are saving money. We buy our groceries wholesale, store them under a seat, and find our little home quite large enough. We have no landlord to bother us and if we find a neighbor undesirable, we can move for a few gallons of gasoline. We have the pleasure and education of constant travel without expense, for I am able to secure positions along the way without difficulty. What I would spend for rent each month goes into the bank.

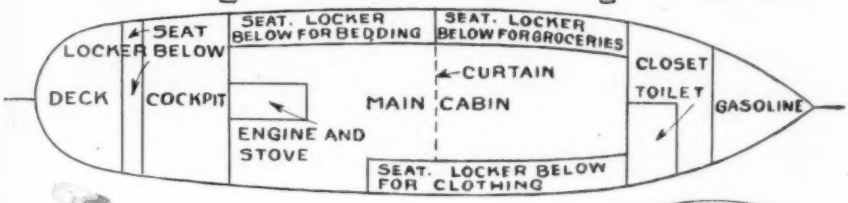
¶ It is estimated that if the forests of the earth were completely stocked and scientifically worked, they would yield annually the full equivalent to from 30 to 120 times the present consumption of coal.

Some Neighbors on the Mississippi

The Floating Home in the Building

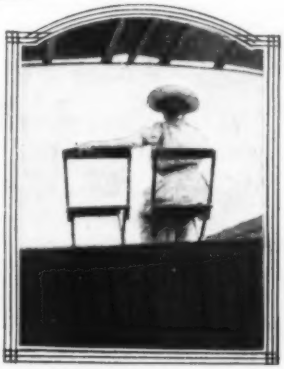


The Winter Anchorage at New Orleans

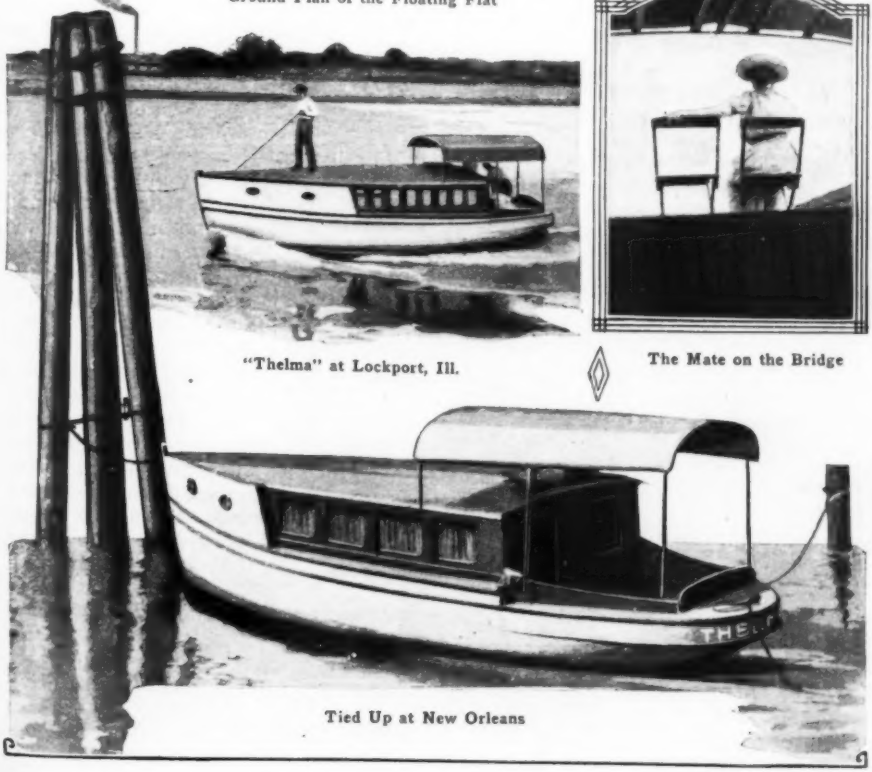


Ground Plan of the Floating Flat

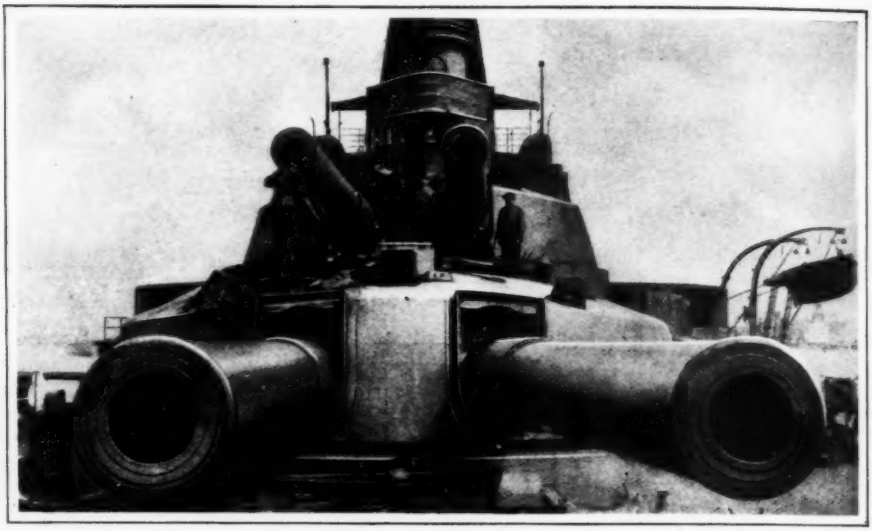
"Thelma" at Lockport, Ill.



The Mate on the Bridge



Tied Up at New Orleans

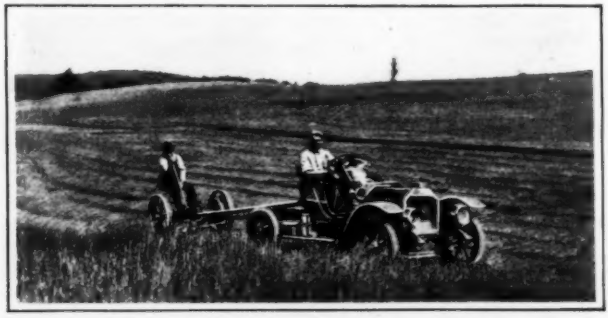


Courtesy London Illus. News

A Remarkable Close-Range View of One of England's Biggest Battleships, the "Conqueror," Which is Equipped with 13½-In. Guns. Two of These Mighty Engines of War with Their Gaping Mouths are Shown in the Immediate Foreground

AUTOMOBILE TAKES PLACE OF FARM HORSES

Of the many uses to which automobiles are being put one of the most unusual is that shown in the illustration, in which a runabout car hitched to a mower is doing the work formerly done by horses. This method is used by a New Hampshire farmer, who finds the car a practical and economical kind of motive power for general service about the farm.



New Hampshire Farmer Uses Automobile for Hauling Mower

POWER GENERATED BY THE SUN'S RAYS

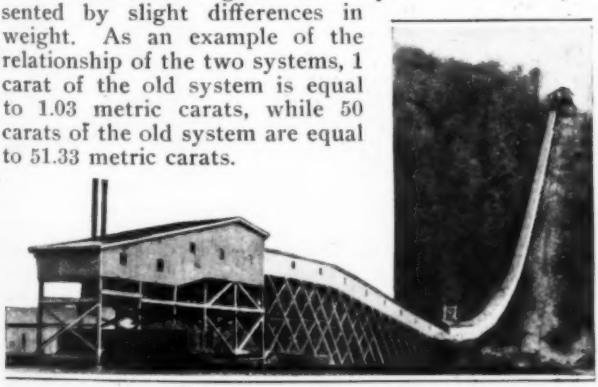
The heat of the sun's rays has been harnessed successfully in Egypt to furnish power for irrigation work, and the possibilities of the scheme are expected to be of great value in the development of the Sudan and Upper Egypt. As the idea of utilizing the sun's heat is worked out in Africa, huge lenses, arranged to focus the sun's rays upon boilers, generate steam without fuel. A simple clockwork device moves the lenses so that they follow the sun's daily movement. During the first few days the plant was operated with zinc boilers, but the heat concentrated by the lenses became so great that the boilers were fused. Iron boilers have now been installed and the system is working successfully.

COSTLY BRIDGE TO SPAN SYDNEY HARBOR

A cantilever bridge costing $13,750,000 is to be built to connect Sydney and North Sydney, Australia. It will span the harbor from Dawes' Point to Wilson's Point, a distance of about half a mile, and its construction will take seven years. Besides four railway tracks, the bridge will carry three roadways, one 35 ft. wide, one 17 ft. 6 in., and the third 15 ft. The plan has just been approved by the Sydney public works committee, and construction will probably be authorized by Parliament at its next session.

NEW SYSTEM OF WEIGHTS FOR GEMS

Beginning July 1, 1913, jewelers and gem dealers generally in this country ceased using the old carat weight of about 205.3 milligrams and adopted the universal metric carat of 200 milligrams, or one-fifth of a gram. To furnish the trade an accurate method for converting the old fractional weights into their metric-carat equivalents, complete tables have been prepared and circulated. Three tables are provided, giving the metric equivalents for sixty-fourths, sixteenths, and carats of the old system. The difference between the two systems is not great numerically, but is important because of the differences in gem values represented by slight differences in weight. As an example of the relationship of the two systems, 1 carat of the old system is equal to 1.03 metric carats, while 50 carats of the old system are equal to 51.33 metric carats.



Novel Conveyor System Used in Kentucky Coal-Mining Plant

INDIVIDUAL CARE OF TREES IN MAINE TOWN

A novel method of providing and maintaining shade trees for the streets is in effect in Farmington, Me., where

Street in Maine Town, Where Each Tree is Maintained by a Citizen

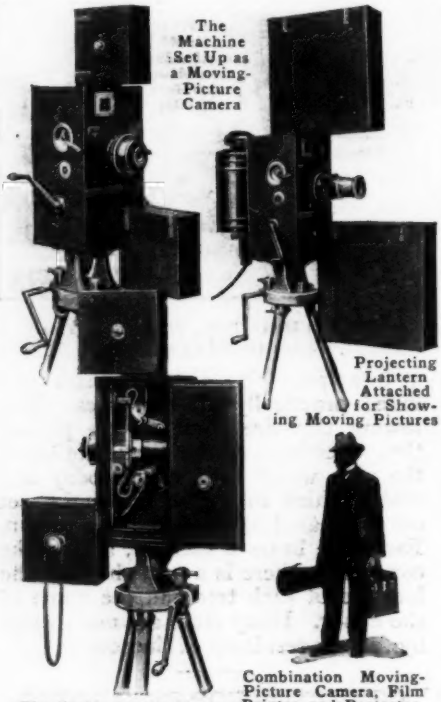
a disastrous fire twenty years ago killed practically all the trees. Following this fire some of the philanthropic citizens of the town originated the plan which is in effect today and under which each tree is bought, set out and cared for by some one person. Each tree bears a number, and in the courthouse there is a map showing the location of each tree and the name of the donor. Many trees are maintained by former residents of the town.

CONVEYOR FOR RETARDING FALL OF COAL

A conveyor that serves the purpose of retarding the fall of coal down the mountain side is an unusual feature in a coal-mining plant in eastern Kentucky. This conveyor is 830 ft. long. It carries the coal from the shaft down the mountain side and over a suspension bridge that spans a river to a point where it is discharged into an ordinary belt conveyor, which in turn carries it to the shaker screens in the tipple.

MOVING-PICTURE MACHINE FOR AMATEURS

A moving-picture machine, which is a combined camera, printer, and projector, put up in compact shape for



The Machine Set Up as a Moving-Picture Camera

Projecting Lantern Attached for Showing Moving Pictures

The Inside of the New Moving-Picture Machine

Combination Moving-Picture Camera, Film Printer, and Projector, Packed for Carrying

carrying, has recently been invented and patented, especially for the use of amateurs. As a camera, it will take moving, still, flashlight, and time exposures, and by means of its projecting device can be used for enlarging to life size. After the film has been exposed, the same machine can be used to print it. A 300-cp. incandescent lamp, to be attached to any light socket, and an adjustable lens quickly transform the machine into a projector for throwing pictures on a screen. The film can be stopped at any time without danger of burning and the machine can thus be used as a lecture stereopticon—700 ft. to take the place of 4,000 ft. of film. A focusing tube running through the camera enables the operator to see his picture as it appears on the film and adjust the focus accordingly. A perforator to mark the end of scenes and an indicator to tell how much film has been used are also provided. The tripod furnished with the machine has a panoramic and tilting head.

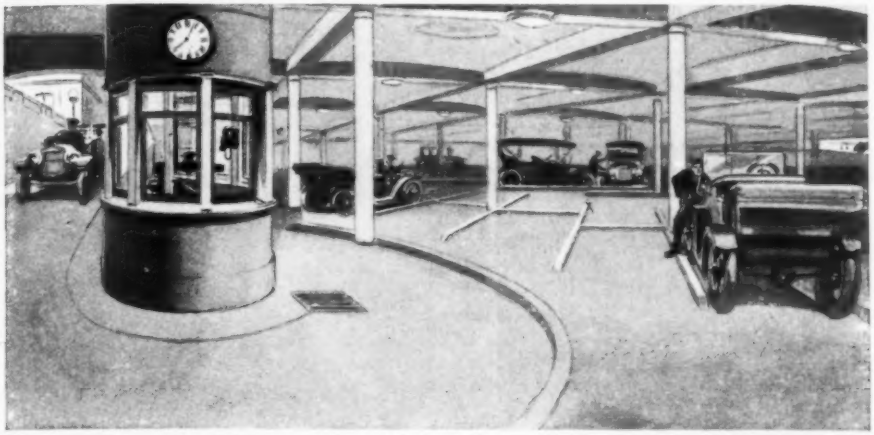
TEXAS COUNTIES BUILD A BOULEVARD

A paved highway, 100 miles long, is being built by several counties in Texas to connect some of the principal cities of the state. When it is completed, the county boulevard will extend from Dallas to Fort Worth, thence to Weatherford and Mineral Wells, and it will be as well paved as any street in the cities along its route. The section from Fort Worth through Tarrant County is now under construction, and surveyors are at work laying out the road from the county line to Dallas. The rest of the road is already completed.

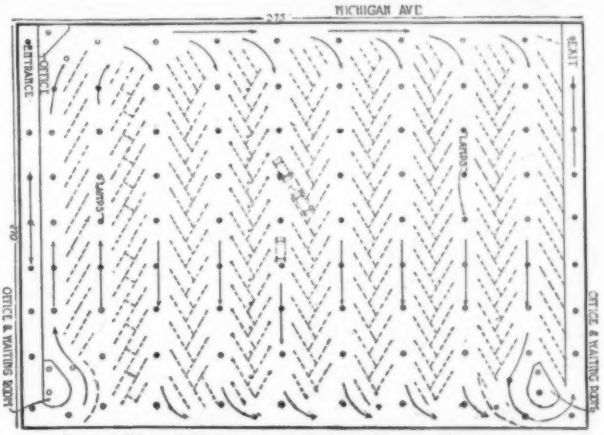
AN ALUMINUM FIRELESS COOKER

Aluminum is used in the construction of the latest type of fireless cooker. It is cylindrical in form and is made in three sizes to hold from 4 to 8 qt. The walls and the tightly fitting cover are made of double sheets of aluminum insulated with ground mica against heat conduction, but the bottom is not insulated. When food is to be cooked, the cooker is placed over a fire until the food is thoroughly heated and then set aside on an asbestos plate, which goes with it, to insulate the bottom. The double walls retain the heat and finish the cooking without burning the food.

UNDERGROUND GARAGE FOR CHICAGO



One Section of Proposed Public Garage under Grant Park at Chicago



Ground Plan of Underground Garage, Showing Arrangement by Which All Travel is in One Direction

For relieving the down-town streets of Chicago of the congestion caused by the parking of hundreds of automobiles along the curbing it is proposed to build an underground garage, 13 blocks long, occupying the space under Grant Park between Michigan Avenue and the Illinois Central tracks and extending from Randolph Street to the Park Row station near Twelfth Street. It is estimated that such a garage would take care of more than 2,000 cars daily. If built as planned, this will be the largest and most novel garage in the world, and will cost over $1,250,000. According to present plans the garage will be constructed in sections, each section to accommodate 225 cars. The material specified in the plans is concrete.

The cars will enter over one inclined roadway and go out over another, so that traffic will be in one direction except when a machine is backing out of its stall. Each stall will be 16 ft. long and 8 ft. wide, and curbings of cement will be placed between stalls so that each car will be free from interference by other cars entering or leaving adjacent stalls. The inclined entrances and exits will have a grade of 4½ ft. to 100 ft., and will extend from the Michigan Avenue front to the rear of the garage. These are so arranged that a car will enter at one end of a section and leave at the opposite end, preventing interference of cars and reducing congestion on the street.

THE SWEDEN VALLEY ICE MINE

One of the mysteries of nature, until recently unexplained, is that of natural ice caves in which ice forms during the spring and summer and melts during the fall and early winter. Such caves, of which at least seven are known to exist in the United States, are entirely different from storage caves which, on account of their sheltered location, preserve, through the summer, ice formed during the preceding winter. One of the best known of the true freezing caves is the so-called Sweden Valley Ice Mine, located near Coudersport, Pa., which is said to be a fine example of a natural summer ice factory.

This cave is really a pit or shaft, about 8 ft. in diameter and about 12 ft. deep, and is located at the base of a steep hill. In winter the pit is comparatively dry and free from ice, the temperature inside being the same as that outside. But in the spring the rain water and water from the melting snow is frozen in the form of icicles as it trickles into the cave, the process continuing until, by July, the sides of the pit are completely covered with a coating of ice, a foot or more in thickness. In the early fall the process stops and the ice gradually melts. The sides of the shaft are of loose shale, in which there are numerous crevices extending back and up into the hill, the rock strata being rather sharply inclined. A draft of cold air, which at some places is strong enough to extinguish a small flame, issues from these fissures in the summer time. This draft is variable, being stronger on hot than on cool days. The temperature at the bottom of the shaft varies from 25 to 32 deg. Fahrenheit.

This apparently strange process, like other natural phenomena, is easily explained when all the conditions are known, and is due to the storage of "cold" during the winter by the circulation of air through the crevices of the rock strata above the pit. In the fall of the year, after the ice has entirely disappeared, the temperature of the air over the pit, in the pit, and in the crevices is the same, and there is no circulation. But as cold weather comes on the air over the pit is cooled rapidly and becomes heavier than the warmer air in the crevices, and forces its way down into the pit and up into the crevices, expelling the warmer air through openings at the top of the hill. This cold air, coming in contact with the rocks, absorbs heat from them, becomes lighter, and is in turn forced upward and out through the top by the cold air entering from the bottom. In the course of the winter the rocks become chilled to a great depth and a large amount of "cold" is stored up, the amount depending on the length and severity of the winter.

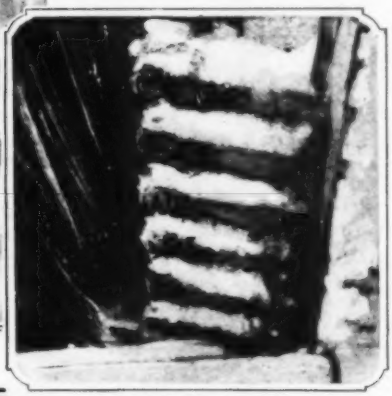
When the warm weather of spring arrives the flow of air is reversed. The air over the pit becomes warmer and therefore lighter than that in the crevices, and the air in the crevices forces its way downward into the pit, being replaced by air that enters through the openings at the top of the hill. This warm entering air is chilled by coming in contact with the cold rocks in the crevices, and the process is continued until the supply of "cold" in the hill is exhausted. Surface water that trickles over the edge of the pit is immediately frozen by the blast of cold air, and ice continues to form as long as the current of air lasts. When the supply of "cold" in the hills is exhausted the circulation of air ceases, the ice in the pit melts, and the system is again ready for the storing-up process.

JEFFERSON'S PORTRAIT ON NEW POSTAL CARDS

Thomas Jefferson's portrait will be substituted for the vignette of William McKinley on the new postal cards which will soon be issued. The change is made in accordance with the long-established custom of altering the designs of stamps and postal cards from time to time, especially when it becomes necessary to prepare a new supply of printing plates.

Interior View of Ice Mine, Showing Ice-Covered Steps at Right

The Opening at the Top of the Shaft



Looking Down the Shaft

General View of the Interior of the Sweden Valley Ice Mine

Diagram Showing Summer Circulation. Cold Air in Crevices, Being Heavier Than Air Outside, Flows into the Pit

Diagram Showing How Cold Air, in Winter, Forces Its Way into the Crevices in the Rocks

THE LAST BOAT LEAVING A SINKING SHIP

Just as the last lifeboat was leaving a sinking steamship off the coast of Alaska, a camera in another lifeboat caught the remarkable picture that is reproduced on this page. The vessel was a passenger boat, the "Curacao," sailing between Seattle, Wash., and Skagway, Alaska. As she was leaving the port of Ketchikan, Alaska, on June 21, she struck a rock on the west coast of Prince of Wales Island and went down within an hour. In the picture, the forward end of the main deck is entirely submerged and the last lifeboat is pushing off from the stern. As no lives were lost, the two boats remaining on the hurricane deck indicate that the steamer carried more than the necessary amount of life-saving equipment.

The Last Lifeboat Leaving the Sinking "Curacao" Off the Coast of Alaska, a Few Minutes Before the Vessel Foundered

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¶The growing popularity of tennis is said to be due to the increased use of inexpensive clay courts instead of costly grass courts.

VIENNA BUILDS DWELLINGS FOR THE POOR

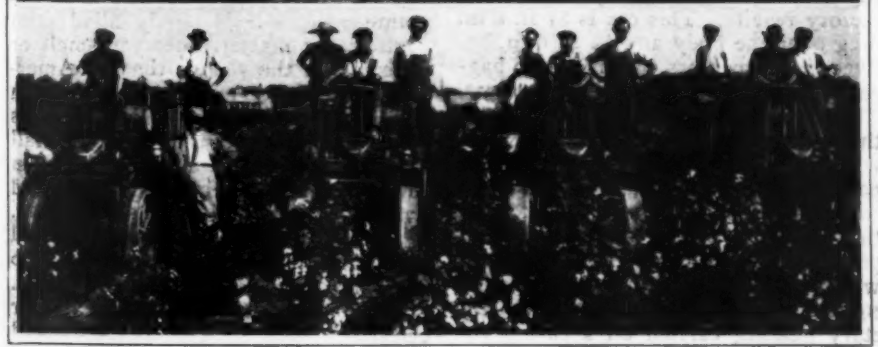
Municipal dwellings for poor workingmen's families are now being built in Vienna, Austria, as a result of the distress caused by the exorbitant rents charged by private owners. Several buildings containing hundreds of workingmen's flats have already been built by the city and more are under construction. Small flats, consisting of a kitchen and a one-windowed room, rent for $5.50 a month, and larger ones having a kitchen and a two-windowed room, cost from $6 to $8 a month. Two serious evils which the poor had to contend with in privately owned flats have been abolished in the city's buildings—tenants can be turned out only for good reasons, after notice has been given, and families with children are preferred. Each house contains a coöperative store, managed by the tenants, and thrift is encouraged in every way.

A MACHINE FOR PICKING COTTON

A motor-driven cotton-picking machine has at last been brought to a point which seems to promise commercial efficiency after 21 years of experimenting, and is arousing much interest in the South. To supplant hand cotton picking, a machine must be able to pass along the rows of cotton plants, pluck off and sack the ripe cotton, and leave the unripe bolls, without injuring the plants. The machine in question is based upon the idea of revolving needles to pluck off the ripe bolls—a simple idea but difficult to apply. Out-

side the gasoline engine, mounted on top to furnish power, the four broad-rimmed traction wheels, the conveyors and bags to collect the cotton, and the high frame to support it as it straddles a row of cotton plants, there is little of interest in the machine except the picking drums. One of these is hung on each side of the machine so as to graze the sides of the plants between the wheels. Each drum carries an endless chain of vertical cylinders which revolve and follow each other around the drum. Projecting from the cylinders are horizontal needles which catch the cotton in the opened bolls and pluck them. As the machine moves forward, the drums, revolving in the opposite direction, carry the cylinders backward at the same speed, so that the needles turn in the plant without moving horizontally through it. The machine will pick from 5,000 to 10,000 lb. a day, depending upon the field, at a total cost of about $6. An average "field hand" can pick from 200 to 400 lb. a day. The machine is also designed to be used as a tractor for plowing and other work.

A Motor-Driven Cotton-Picking Machine Straddling a Row of Plants



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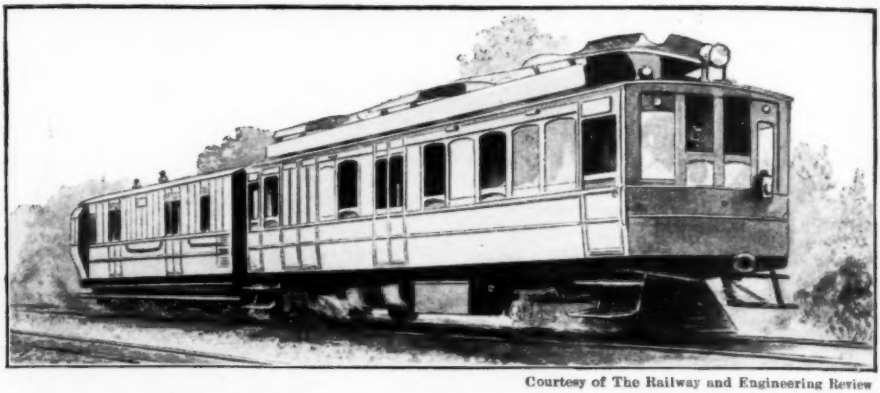
Above: A Day's Picking in the Sacks
Below: These Four Machines will Do the Work of 100 "Hands"



Courtesy of The Railway and Engineering Review

South African Railway Car with Combined Gasoline and Electric Propulsion

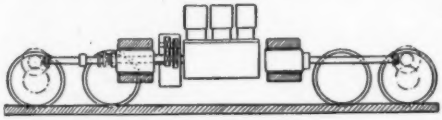


Diagram Showing Arrangement of Transmission System for Railway Motor Car

GASOLINE-ELECTRIC POWER FOR RAILWAY CAR

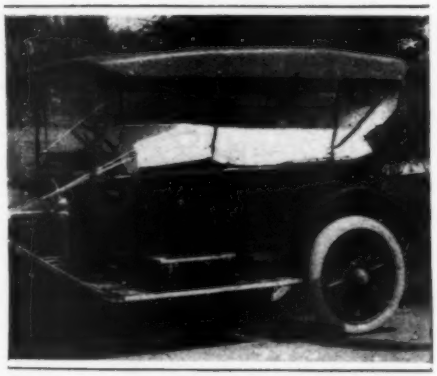
A motor car which employs a novel combination of gasoline and electricity for propulsion is in operation on the South African Railways with satisfactory results. This car is 37 ft. 6 in. long over the body and 22 ft. 6 in. between truck centers, and has both baggage and passenger compartments. The total weight of the car is 21 tons, the motor alone weighing about 4 tons, while there is seating capacity for 42 passengers. The car is driven by a combination of direct propulsion from the gasoline engine and secondary propulsion from two electric machines which are operated by the gasoline engine. This is accomplished by planetary gearing carried on a casing rotated by the engine. This gearing turns the two sleeved shafts independently of each other, the outer shaft going to the second electric machine and the inner shaft to the first electric machine and to the propeller of the car. The whole mechanism is handled through one controller. A storage battery which is charged by these machines is capable of propelling the car in case of emergency for a distance of eight miles at a speed of four miles an hour. This battery is also used for starting and stopping the engine, and for lighting the car. A maximum speed of 50 miles an hour has been obtained in tests of this car, when operated on level track.

INTERSTELLAR SPACE AND ITS CONTENTS

That interstellar space is not an absolute void, but is partly filled with particles of matter, however small or invisible, is the theory that an American astronomer has evolved through the study of comets. His theory is based upon the fact that all bodies fall at the same rate in a vacuum, but in the open air lighter bodies are retarded by friction and fall at a slower rate. If interstellar space were a vacuum, all stars, comets, and planets would keep the same relative position and speed. But if it were not a vacuum, the lighter celestial bodies, such as comets, would tend to be retarded by friction and fall behind the larger and denser bodies. This retarding would be most noticeable at the part of the comet's orbit which is farthest from the sun, and the comet would tend to change its movement at this point and assume an individual direction. This hypothesis seems to be borne out by his observations.

A FOLDING BED FOR AUTOMOBILES

An automobile bed which has been used by a Tacoma (Wash.) doctor for three years and is now patented and manufactured is shown in this picture. While the bed is strong, comfortable, and easy to adjust, no weight is placed on a weak or highly polished part of the car. The head of the bed rests upon two slanting rods, 52 in. long, extending from the floor in the two corners behind the front seat up to the back of the tonneau; the foot is supported by legs resting on the front seat with the cushions removed. The bed itself is made of heavy canvas with stretcher bars, 54 in. long, at each end and ropes running to the front and rear springs of the car. When the top and



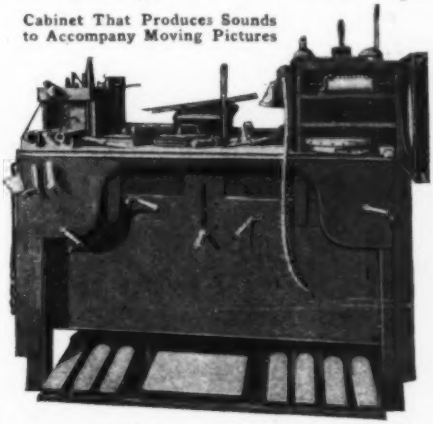
A Comfortable Bed for Two Persons That can be Set Up in the Tonneau of an Automobile

curtains are raised, the bed makes a comfortable berth for two grown persons and a child, with the front seat for a dressing room. The bed is stowed under the rear seat and the bars under the running board, when not in use.

SOUND CABINET FOR MOVING-PICTURE PLAYS

A cabinet capable of imitating a large number of sounds in a realistic manner, and designed to accompany moving pictures, is now being introduced. It is operated by one man, all the controlling parts being within easy reach and so arranged that a number of sounds can be produced at one time. The machine does not reproduce talk, but is capa-

Cabinet That Produces Sounds to Accompany Moving Pictures



ble of imitating practically every other kind of sound required in the production of a play. The whole mechanism is inclosed in a compact case that weighs only about 250 lb. when fully equipped.

CUTTER FOR SCALLOPING FRUIT RINDS

A simple little device for scalloping fruits and vegetables has recently been brought out. It consists of a wooden trough with a scalloped blade down the center which cuts the rind neatly and symmetrically as the fruit is rolled along the trough. The scalloper can be used for oranges, lemons, grapefruit, apples, cucumbers, etc., or for cutting the rinds of fruits that are to be hollowed out and used as serving cups for salads, creams, and ices.

Wisconsin's New State Capitol Building at Madison, Now Nearing Completion

THE NEW WISCONSIN STATE CAPITOL

By GERTRUDE G. WALKER

The fourth highest dome in the world is that of the new Wisconsin state capitol, with a height from the ground of 269 ft. 8 in. without the bronze statue of a woman which will increase it to 287 ft., more than the width of seven city lots. The three domes which are higher are those of St. Peter's cathedral at Rome, 330 ft.; the Duomo at Florence, Italy, 310 ft.; and the national capitol at Washington, 307½ ft. The dome on the Wisconsin capitol is more than 104 ft. in diameter, nearly as wide as three city lots, at the base. It is constructed of concrete, reinforced with 2,300 tons of steel, with an exterior wall made of 8,000 tons of white granite. In order to place the main steel girders, each of which weighed 23 tons, it was necessary to erect a square steel tower through the center, with derricks which could be moved from corner to corner. The dome alone will cost $2,500,000, considerably more than one-third the price for the whole building, which is limited to $6,000,000.

The capitol is built diagonally in the center of a beautiful park of more than 14 acres. It is on the highest point of land in the city of Madison, a hill 80 ft. high between the two lakes, Monona and Mendota. The building corners on the cardinal points of the compass with a wing facing in each of the four directions. The walls of each wing tower four stories to a height of 100 ft. Each wing is 128 ft. wide and 160 ft. long to the central portion below the dome, which is 112 ft. square, making more than two acres of floor space in every story and about eight acres in the building. The walls of each wing are constructed of 4,000 tons of white granite, which cost approximately $300,000. With furnishings, each wing will cost $800,000.

The most elaborate room in the new capitol is the governor's reception parlor, which has been fitted up at an expense of $65,000.. The two Turkish rugs alone are worth $4,000. The walls and the ceiling are ornamented with historical and allegorical paintings, which cost $23,000. The parlor is an imitation of the Paolo Veronese room in the Doges' Palace at Venice, Italy. To gain the appearance of age, the artist has given the gilt trimmings a velvet finish and has made the floor of dull-finished teakwood. The furniture was made especially for this room, each piece being of Circassian walnut and bearing the Wisconsin coat-of-arms.

While Wisconsin quarries have furnished the granite for the building, the whole world has been searched for materials for the finer work. Marbles and stones have been secured from Italy, Greece, Africa, Germany, France, Mexico, and from Tennessee, Vermont, and Minnesota. The Circassian walnut for the furniture was imported from the region around the Black Sea.

Heat and power for the new building will be supplied from a private station, half a mile away, connected with the capitol by an underground tunnel, 8 ft. square, with walls of solid concrete, 2 ft. thick, reinforced with steel. Through this tunnel are run heavy cables to transmit the electricity to light the building and to work the elevators and bells. Great pipes through the tunnel will carry steam and water. The pressure on this water will be only 150 lb., not enough to force streams up the 270 ft. to the top of the dome. In order to protect the dome, an electrically driven centrifugal pump is installed within the capitol itself, which will deliver water under pressure of 300 lb. at the pump. In the dome, there will be 19 outlets for hose from this pump.

The construction of the new Wisconsin capitol has been continuous since 1901, when the excavation was begun. The building must be completed before 1917. Parts of it are already in use by state officials.

PIPE ORGAN MADE OF WALL PAPER

A unique and attractive means of advertising his wares is employed by an Ohio wall-paper dealer, who has

Full-Sized Model of Pipe Organ Serves as Advertisement of Wall Paper

placed in his display window a full-sized model of a pipe organ. The interesting feature of this model is that everything about it—keys, pipes and all parts of the case, as well as the sheet music and music rolls—is made of wall paper, a variety of patterns being used to imitate the different parts.

EUROPEAN PEARL FISHERS IN AUSTRALIA

That European divers do not have the physical strength to compete with the Asiatics has been indicated very strikingly by the attempt of the Australian government to encourage the employment of white men in the pearl-fishing industry. All the European divers died or became paralyzed within two years. Financially the attempt was also a failure. The catch of the European diver never amounted to more than a ton a year, while the Asiatic could bring up four or five tons a year. And the white man asked as much as $70 a month, and traveling expenses from Europe, to compete with Asiatic divers who work for $10 to $15 a month.

DOORWAY IN NEW LINER'S RUDDER

The rudder of the new Cunard liner "Aquitania" is so large that it has a doorway in the bottom to admit workmen to the interior. If at any time it should be necessary to take the rudder off the ship, workmen must get inside the rudder to remove the connecting pin. The pin is 4 ft. long and larger than the heaviest projectile used in modern artillery.

STONE TREE ERECTED AT HUNTER'S GRAVE

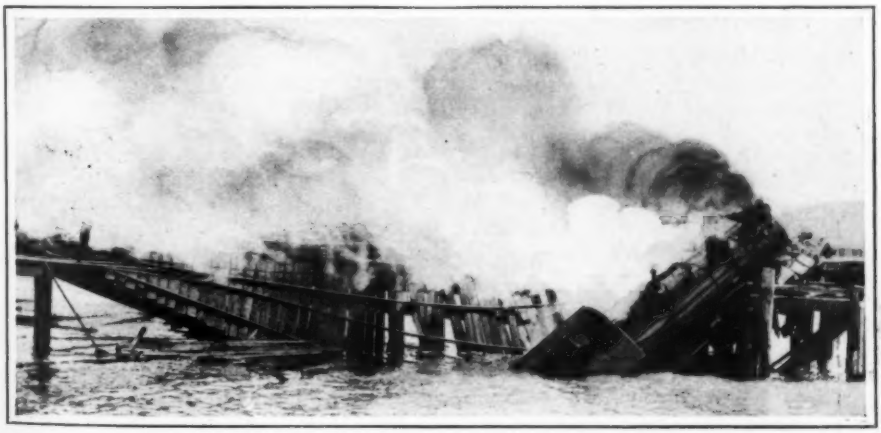
A huge tree stump cut out of stone marks the grave of David Huston, of Bono, Ind., a great hunter and trapper of former days. His gun, powder flask, and horn, in stone, hang from the stub of a branch on one side, and his dogs in miniature are chasing a fox about the base. Ferns and wild sprouts cover the roots and a large grapevine winds its way to the top, 21 ft. above the ground. The monument was designed by a friend of the hunter.

SIGNPOSTS TO WELCOME TRAVELERS

Motorists are received in a very courteous manner by the city of Aurora, Ill. Signs stationed like outposts on all the roads form a reception committee to welcome the tourist and put him in a pleasant humor before he crosses the city limits. Instead of frightening him away with a warning of a fine for exceeding the speed limit, the signs merely give him a kindly hint that excessive speed is not desirable. To a motorist approaching the city, the signs read, "Aurora. Welcome to Our City; Watch Out for Cops!!" and as he leaves the city, the other side of each sign says, "So Long. Come Often and Stay Longer."

WORM-EATEN PILES SNAPPED BY LOCOMOTIVE

Teredos, by honeycombing the piles of a wharf, caused the wreck shown in a picture on this page. The wharf, located at Tiburon, Cal., was less than six months old, but the shipworms, or teredos, had weakened the piling so badly in that time that it crumpled up under a Northwestern Pacific locomotive, June 30. Both enginemen jumped and no one was injured. It will be noticed that the photograph was taken before all the steam had left the boiler.



Wreck Caused by the Breaking of Worm-Eaten Piles

MAKING SHINGLES FROM OLD STUMPS

Making shingles from the old stumps of cedar trees that once covered the western slope of the Cascade range of mountains is a profitable though comparatively unknown business. The new forests and swamps are searched for these old stumps, which are sawed into "bolt" lengths and hauled to the nearest shingle mill, of which many are to be found in this region. Many of the old stumps are so large that, in some instances, 10,000 shingles have been obtained from a single one.

Stumps of Ancient Cedar Trees of Immense Size: Ten Thousand Shingles have been Made from a Single Stump

ELECTROSCOPE MEASURES RADIUM DISCHARGES

An electroscope which actually measures current strengths as small as one ten-trillionth of an ampere was recently exhibited before the French Academy of Sciences. The practical value of the instrument has to do with radium. The use of radium emanations for medical treatment is steadily increasing and there has so far been no device sufficiently sensitive to detect the presence of such feeble discharges, excepting the gold-leaf electroscope, which, however, furnishes no measure of the discharge. The new device, which is a torsion electroscope, acts as a real electrometer, the current causing a pointer to move over a properly calibrated scale.

¶An announcement of considerable importance to motorists is that of the discovery of a substitute for acetone, which, it is stated, can be sold at about half the price of the true acetone.

MODEL HOUSE DESIGNED BY HIGH-SCHOOL PUPILS

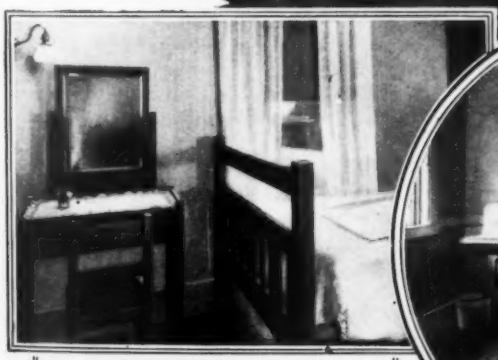
A model house, designed by high-school pupils for the demonstration of household science, was completed a short time ago in Springfield, Mass. With the exception of the paper hanging and a part of the masonry, the house was erected by boys in the technical high school and in the vocational school of that city. The house, which stands in the rear of the technical high school, was begun in 1910. The design and working plans were drawn by a girl in one of the classes, her work receiving the award in a competition. The boys drew the elevations, and the vocational pupils did some of the rough work and the framing. As there is no class in plumbing for the high-school boys, the students of the evening trades school did this part of the work, and also the electric wiring.

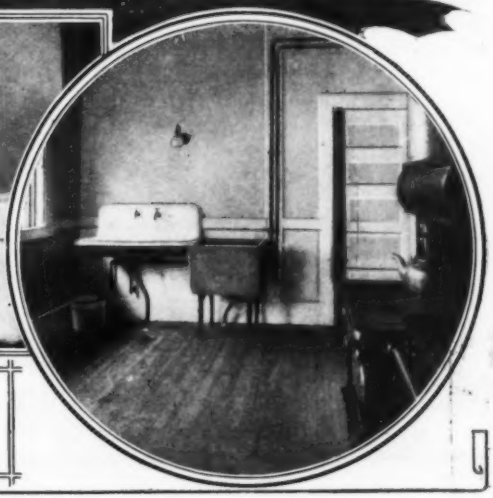
The house is of an attractive bungalow style with an overhanging roof, and is 24 by 35 ft. It is divided into a large living room, hallway, dining room, bedroom, bathroom and storeroom. The rooms are neatly finished in fumed oak, gumwood and Georgia pine. The girl pupils made the tiles for the fireplace, stenciled the designs for the walls and curtains, and made the curtains, bed linen and table linen.

The house is not only attractive and convenient, but decidedly practical for

The Large Living Room, Tastefully Decorated by the Girls

The Model House Designed and Built by School Pupils in Springfield, Mass.





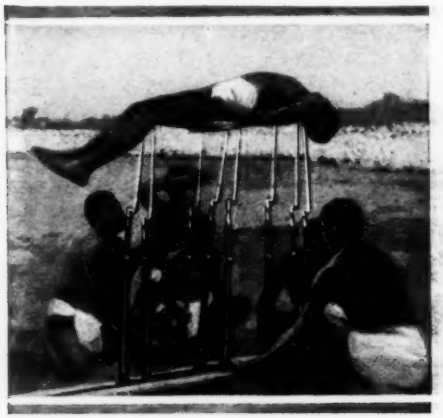
The Bedroom of the Model House

The Practical, Workaday Kitchen

the purpose for which it was constructed. The girls of the school will receive practical training within it. They will learn how to care for the rooms, how to prepare meals, and many of the graces of entertaining.

HINDOO JUGGLER SUPPORTED ON BAYONET POINTS

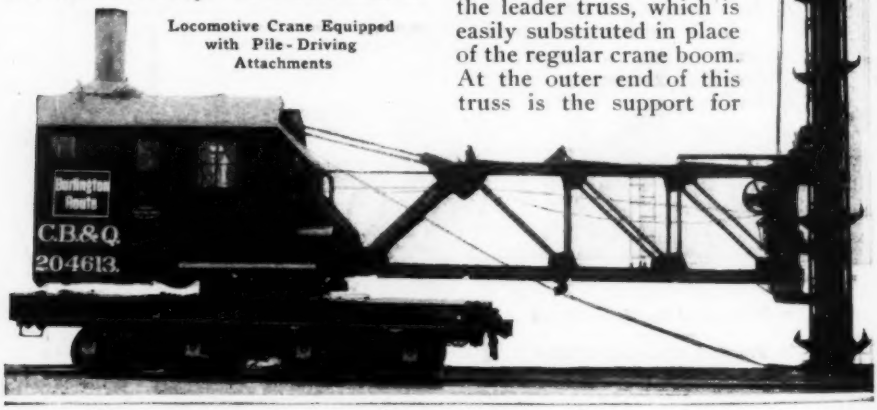
One of the many seemingly incredible feats performed by Hindoo jugglers is that of supporting a man on the points of bayonets. The man is raised on a framework of bamboo, which is removed as soon as the bayonet points are properly placed in contact with the body. It is said that so long as the man lies rigid there is no danger of injury, but that if he moves slightly he is likely to be pierced by one of the bayonets, on the same principle that a razor blade may be pressed against the flesh without cutting if it is held absolutely still. The only explanation offered for the man's immunity from injury is that he has been trained to this feat from childhood, and that calloused spots have developed that are thick enough and tough enough to withstand the sharp points of the bayonets.



Man Supported on the Points of Eight Bayonets: One of the Striking Feats of Hindoo Jugglers

COMBINED PILE DRIVER AND LOCOMOTIVE CRANE

For the convenience of railroads and contractors requiring a pile driver only a portion of the time, a combination locomotive crane and pile driver has been developed. The construction of this machine does not differ in any important detail from that of an ordinary 30-ton crane. The 24-ft. car is built entirely of steel, while a boiler of large steam capacity is provided to meet the demands of varying conditions of service. The functions are the usual ones of a locomotive crane. As a pile driver the distinctive feature is the leader truss, which is easily substituted in place of the regular crane boom. At the outer end of this truss is the support for

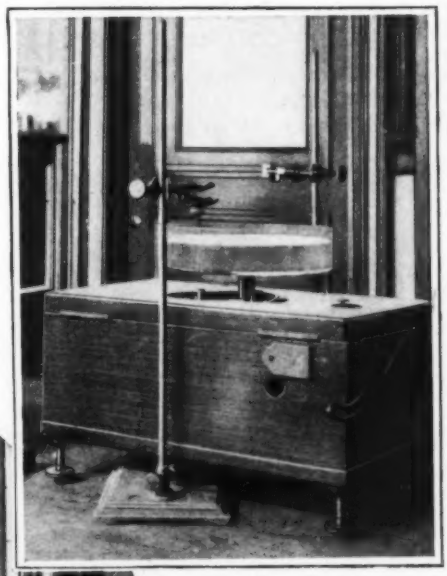


Locomotive Crane Equipped with Pile-Driving Attachments

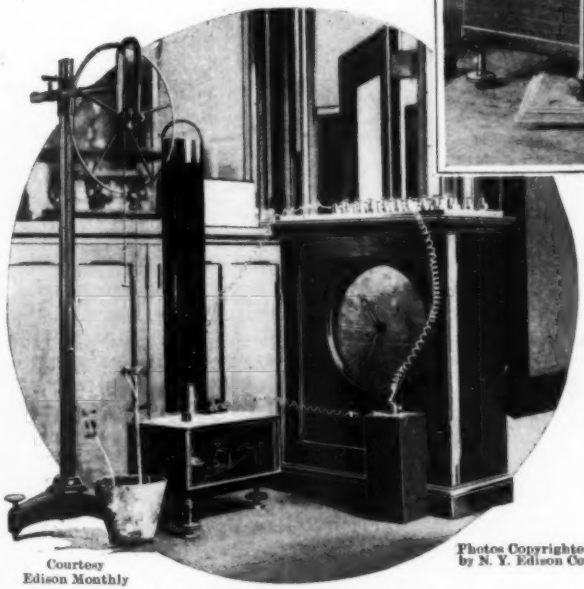
the leaders and the battering attachment. The combination of truss and lead is sufficiently rigid to hold piles upright against any tendency to get out of plumb while they are being driven.

MEASURING THE GROWTH OF PLANTS

Very delicate and exact instruments are required in the scientific study of plant life. Among them may be mentioned the "auxanometer," which measures the rate of growth of a plant, and the "klinostat," which illustrates the growth of a seedling. In the growth-measuring machine a thread is attached to the growing apex of the plant and is then passed over a small wheel on a spindle, which also bears a wheel many times the diameter of the first. The large wheel also carries a thread, one end of which is attached to a pen or light straw resting lightly against the surface of a smoked paper covering the recording cylinder, which is made to revolve at any desired rate. As the plant grows the wheels revolve, the large wheel magnifying the extent of growth measured by the smaller one and registering it upon the smoked paper of the cylinder.



For Showing How a Current of Water Affects the Growth of a Seedling



Courtesy Edison Monthly

Photos Copyrighted by N. Y. Edison Co.

For Measuring the Rate of Growth of a Plant

In using the "klinostat," a seedling is suspended in a dish half filled with water, and this dish is made to revolve at a given rate. Ordinarily one would suppose that the action of the water upon the seedling would incline the latter in the direction of the current, but, on the contrary, the root of the seedling is shown to incline against the stream.

¶ The Federal Lighthouse Bureau and the Forest Service are coöperating to use the large reservations attached to the Great Lakes lighthouses for growing timber.

INTERNATIONAL POSTAGE COUPON

A system of coupons designed for convenience in forwarding return postage to foreign countries is now in ef-

Coupon Issued by the U. S. Postoffice Department

fect in all the countries included in the Postal Union as well as in some other countries which have made special arrangements for issuing and honoring such coupons. In the United States these coupons can be bought or cashed at any international money-order postoffice. A charge of 20 per cent is made for the service, which means that in this country a charge of 6 cents is made for a coupon redeemable in a foreign country for 5 cents worth of stamps, while in France a 25-centime coupon is sold for 30 centimes. In redeeming the coupons an American 1-cent stamp is considered equivalent to

Coupon Issued by the French Government

5 French centimes, and similar equivalents are in effect for carrying out the arrangement in other countries.

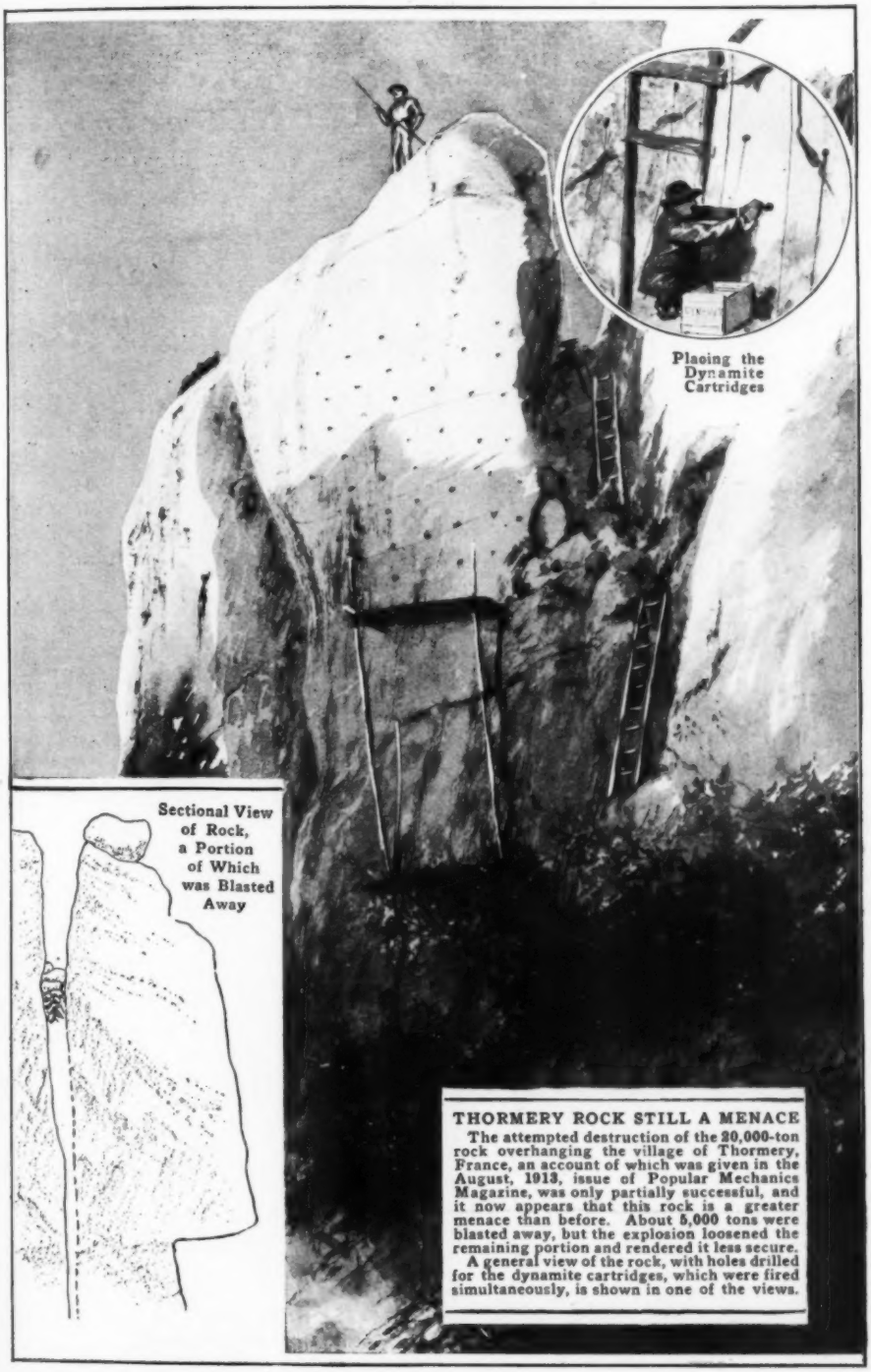
POWDERED COAL LESSENS SMOKE NUISANCE

That the use of powdered coal in puddling and heat furnaces results in a great reduction in smoke as well as in economy, has been demonstrated by an Ohio steel mill. An eight months' test has shown that the average consumption is 1,120 lb. of powdered coal, as against 2,186 lb. of hand-fired coal, per ton of furnace output. In addition, the use of powdered coal, which is practically smokeless, has done away with the loss of time due to cleaning furnaces and has made possible one more heat a day than in the hand-fired furnaces. Waste-heat boilers for generating steam added to the powdered-coal furnaces evaporate from 6 to 7 lb. of water to 1 lb. of coal. The decrease in smoke, added to this economy, has interested smoke inspectors as well as steel manufacturers.

PLANTING TREES TO BIND DRIFTING SAND

Trees can be used very successfully to hold sand and convert seashore wastes into beautiful pleasure grounds, as has been shown by the reclamation work carried on by the United States forest service in various parts of the country. The building of Golden Gate Park, San Francisco, on an area of shifting sand dunes is a notable example of reclamation in America, which is often compared with the planting of a valuable forest of maritime pine, the source of French turpentine, on the sand wastes of the Landes, France. As a result of its success in this work, the United States forest service has recently been asked by an agricultural colony in Palestine to assist in planting trees to convert the sandy shore of the Mediterranean near Jaffa, the ancient Joppa of the Bible, into a seaside resort.

¶A flying boat capable of carrying four passengers is engaged in regular ferry service across Coos Bay in the state of Washington.



THORMERY ROCK STILL A MENACE

The attempted destruction of the 20,000-ton rock overhanging the village of Thormery, France, an account of which was given in the August, 1913, issue of Popular Mechanics Magazine, was only partially successful, and it now appears that this rock is a greater menace than before. About 5,000 tons were blasted away, but the explosion loosened the remaining portion and rendered it less secure.

A general view of the rock, with holes drilled for the dynamite cartridges, which were fired simultaneously, is shown in one of the views.

A Typical "Road-Dragging Day" in Iowa. One Drag was

"ROAD-DRAGGING DAY" IN IOWA

"Road-dragging day" has become an established institution in certain sections of Iowa. On a recent occasion of this kind at Diagonal, several hundred people gathered from the surrounding country bringing with them 166 drags. An idea of the variety of motive power used is given by the fact that one drag was drawn by a goat team while another was drawn by a motorcycle.

LONG BRIDGE WHICH RESTS ON FLOATING LOGS

Lake Chemong, Ontario, is crossed by a floating wagon bridge a mile long. Its narrow, double-planked roadway does not rest on pontoons, but is supported by a floating framework of logs, anchored with stones at short intervals. Although the bridge was built by the municipality nearly 20 years ago, it is still in service. The accompanying photograph was taken from the draw which is provided for small lake boats.

A Floating Wagon Bridge, a Mile Long, on Lake Chemong, Ontario

THE CAPACITY OF THE PORT OF HAMBURG

With a record of 14,000,000 tons of freight unloaded from 18,400 vessels in 1912, Hamburg, Germany, is rightfully called the greatest commercial port in continental Europe. Because of her location on the Elbe River, at the junction of the Alster and the Bille, her river frontage and docks are measured in miles. Over 130,000 linear feet, almost 25 miles, of dockage furnishes an area of 5,000,000 sq. ft. which is reserved for handling package freight alone, and an extension of 40,000 linear feet is now being built. Other quays are provided for bulk cargoes that are unloaded directly into cars, lighters, or warehouses, and an unloading crane has been installed for every 65 ft. of quay. Among others there are 650 three-ton ship cranes, operated by steam or electricity from a municipal power plant, 100 electric traveling cranes, a number of huge double cranes, and several 75-ton Hammer-type cranes which pick up cars and

Drawn by a Goat Team and Another by a Motorcycle

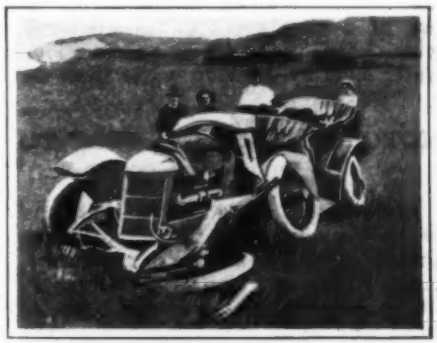
empty them bodily into ships' holds. The quay sheds are 200 ft. wide and their switch tracks connect them with railways running to every part of Europe. From the harbor to the open sea, 50 miles away, the old 15-ft. channel of the Elbe has been deepened to 37 ft., and 12 dredges are now at work lowering the bottom to 40 ft. Traffic across the river is carried by several bridges and a tunnel for pedestrians and teams. The tunnel consists of two 20-ft. wrought-iron tubes with elevators at each end.

MINE OBSTRUCTION REMOVED BY DIVERS

Two skips which were lodged in a mine shaft near Angels Camp, Cal., and which blocked all attempts to unwater the mine, were successfully removed by deep-sea divers. Following a fire which destroyed the mill, hoist and other equipment, a pumping outfit was installed and it was then found that the water had lodged the skips so firmly in the shaft that it was impossible either to dislodge them or to unwater the shaft below the obstruction. Two deep-sea divers were employed, who not only extricated the skips from their position and sent them to the surface, but retimbered and repaired portions of the shaft that had been damaged. All the work was done under from 50 to 100 ft. of water.

MOTOR CAR SOMERSAULTS IN THE AIR

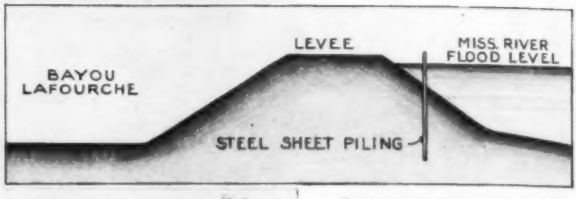
A skid in the sand at a speed of 100 miles an hour caused an automobile to fly high in the air and turn a somersault, during a trial race near Johannesburg, British South Africa. The machine, carrying a driver and four passengers, skidded as it made a turn at high speed at the foot of a hill and crashed into a rock beside the road. Eye-witnesses said that the car flew in the air as high as a telegraph pole, somersaulted, and landed 50 ft. beyond the rock, right side up but facing in the opposite direction. Two of the passengers were killed and the other two were seriously injured, but the driver was pinned in by the steering post and unhurt.



The Wreck of an Automobile Which Turned a Somersault High in the Air

LEVEE SAVED BY STEEL SHEET PILING

Driving Steel Sheet Piling for Protecting Levee against Mississippi River Flood



Section of Levee, Showing Location of Steel Sheet Piling

During the recent high water in the Mississippi River an ingenious method was adopted for stopping the leaks in the levee across the Bayou Lafourche in Louisiana. This levee is one of the best known in the South, not only for its size, but because of the successful use of a siphon, 18 in. in diameter, which keeps the bayou at a certain low-water level by drawing water from the river. This levee is an ordinary earth embankment which under the continual pressure of the high water had become thoroughly saturated, and was developing dangerous leaks and "boils." It was decided to strengthen the embankment with a row of steel sheet piling driven continuously throughout its length. Piling of the length required for this purpose was not to be had in the short time available, but there was an ample supply of steel sheet piling, in 15-ft. lengths, close at hand. By welding these together in groups of three, 45-ft. piles were produced that served the purpose satisfactorily, the welding being done with an oxyacetylene blowpipe. Although these piles were of light section, they were driven to a penetration of from 34 to 38 ft. through brick riprap and dense sand.

MOTORBOAT RULES APPLY TO FLYING BOATS

Flying boats should carry lights and life preservers, like other motorboats, according to the New York Commissioner of the Department of Commerce. Although the usual motorboat equipment may be an impediment when the boats are in the air, it is thought that the safety of other boats demands that they carry signal lights, if they cruise on the surface after sunset. Whistle, foghorn, and bell are included in the equipment prescribed by the act of June 9, 1910, and if passengers are carried for hire, certain life preservers must also be provided.

¶A 575-mile nonstop aeroplane flight from Paris to Berlin was accomplished in 9 hours on July 13.

ONE-MAN FIRE BRIGADE ON NEW LINER

A new kind of fire-fighting apparatus for ships, which enables one man stationed in an out-of-the-way compartment to detect and extinguish a fire in any part of the vessel, has been installed on one of the new ocean liners. The business end of the apparatus is a tall cabinet, looking much like a small church organ, which stands among the compasses, switchboards, etc., in a little room on the third deck. Standing open in this cabinet are the ends of 28 pipes which lead to the bunkers, boiler rooms, and every other compartment in the ship. If a fire starts in any part of the vessel, a curl of smoke or gas comes up the pipe and is detected by a man on watch. He immediately signals to find whether every one has left the burning compartment, and when it is empty he claps the nozzle of a large steam pipe in the end of the pipe from which the smoke is coming. Instantly the burning compartment is flooded with steam in such quantities that it

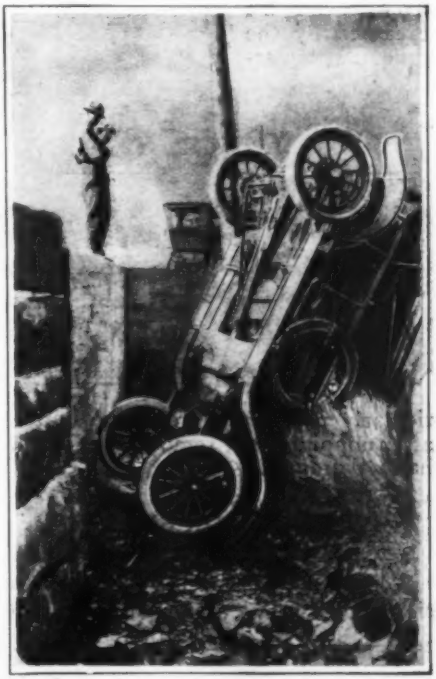
Photo by Brown & Dawson

With This Apparatus One Man can Detect and Extinguish a Roaring Fire in Any Part of the Ship

forms a heavy moist blanket sufficient to smother any fire. One man is thus able to do the work of a whole fire brigade.

AUTOMOBILE'S ACROBATIC FEAT

The automobile standing on its head in the accompanying photograph dived from the top of the culvert beside it



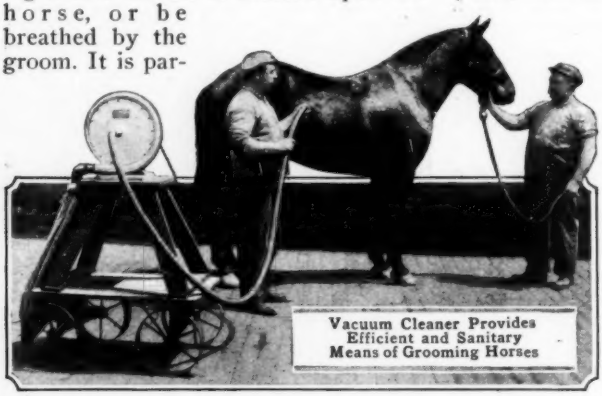
The End of an Automobile's Dive over a Culvert

without injury to any of its seven passengers, six adults and a baby. The accident occurred while the driver was trying to turn around at the end of a street in Massillon, O.; he put his foot on the accelerator button instead of the brake pedal. The front wheels climbed over an 8-in. wall and the car slid over the edge slowly.

HORSES GROOMED WITH VACUUM CLEANER

A vacuum cleaner for grooming horses is in use at the Central Park stables of the New York City Park Department and has been found to give excellent results. A special curry comb is used to stir up the dirt, which

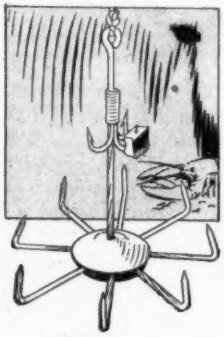
is then sucked through the cleaner and into the dust bag. The machine is mounted on a truck and is run by electricity, and has the advantage of removing all the dirt without scattering it into the air to resettle upon the horse, or be breathed by the groom. It is particularly useful for grooming horses after clipping, as it removes the loose hairs thoroughly.



Vacuum Cleaner Provides Efficient and Sanitary Means of Grooming Horses

NEW HOOK FOR SNAGGING LOBSTERS

A patented lobster hook of the design shown in the accompanying illustration has recently appeared on the market. The circle of sharp points below the bait hooks is intended to snag the lobster and keep it snagged until it can be drawn above the water. This lobster hook is 6 in. in diameter and 7 in. long; it weighs 10 ounces.



¶The Australian state of New South Wales is planning to build government works for making cast-iron pipe for water, sewerage, and other public uses. It already has its own brick yards and joinery works.

NEW THEORY REGARDING LOST PICTURE

That the "Mona Lisa" portrait, Leonardo da Vinci's famous masterpiece, was not stolen from the Paris Louvre but was destroyed or hopelessly damaged during an attempt to clean and repair it, is coming to be the generally accepted theory in France. The portrait disappeared from the Louvre on Aug. 21, 1911, and the story of theft given out by the examining magistrate was based on a chain of circumstantial evidence which placed the guilt on a man seen in the corridors after closing hours. But the portrait as it hung on the wall weighed 212 lb. and, stripped of its frame, the panel that would have to be carried away, 145 lb. in weight, would appear to be a heavy load for one man. The picture, furthermore, was in such disrepair that a jar would have demolished it, and only a few days before it disappeared the official restorer of the Louvre had declared his intention of repairing it. Also no inquiry was made until 24 hours after its disappearance.

PONTOON BRIDGE ERECTED IN THREE HOURS

Following the flood in March, this year, in which two bridges spanning the Miami River at Miamisburg, Ohio, were swept away, a pontoon footbridge, 551 ft. long, was erected and made ready for service in less than three hours. This bridge is carried on 31 floating piers, each of which consists of six water-tight barrels, the barrels being held in position by wooden bucks, or saddles, to which they are firmly wrapped by heavy wire. Each of the barrel piers, or floats, is attached by two stay wires to a double ½-in. cable running across the river at a

Swinging the Barrel Pontoons into Position

Pontoons in Position Ready for the Floor

height of 10 ft. above the water level, while the floor, made in 18-ft. sections, firmly bolted together at the ends, serves to form the bridge into one continuous footwalk. This form of construction provides the greatest flexibility for meeting the rise and fall of the river. The structure was put up at small expense for material only, as all the labor was donated. The bridge is so arranged, that when necessary to permit the passage of boats, or for safety in time of flood, it can be disconnected at the center, and the two ends can be swung in along the shore.

Completed Bridge in Service with Electric Lights Installed

PUSHING A WHEELBARROW 1,500 MILES

With their baggage and camp kit packed in a barrel trundled on a bicycle

The Baggage Train Accompanying a Family of Four Persons on a 1,500-Mile Walking Trip

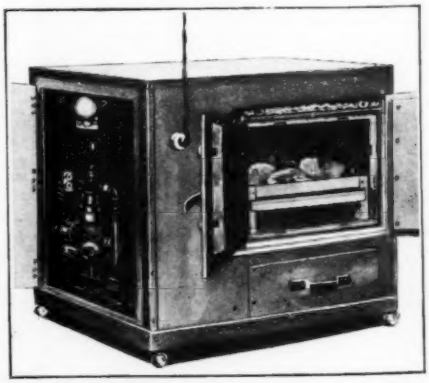
wheel, a family of four persons started out on July 8 to take a 1,500-mile walk from Sandpoint, Idaho, to St. Paul, Minn. Two persons in the party, with the dog, are shown in a picture on this page—their two sons, aged 9 and 11, accompanying them. The barrel carried on the pneumatic-tired wheelbarrow contains a small tent, camp equipment, and extra clothes; two rifles are slung on the handles. The entire outfit weighs only 75 lb. The party is thus prepared to camp wherever night overtakes it, and the trip is expected to take about two months and a half.

FIRST REPAIRS ON A ROOF 500 YEARS OLD

The old wooden roof of Westminster Hall, London, is about to be overhauled and repaired for the first time since it was erected, in 1399. It is one of the most famous specimens of the Gothic open timber roofs and after five centuries shows only slight signs of decay. Most of the repairing is needed at the points where the wall posts touch the walls and where the beams and posts cross, in the northern end of the building. The amount of timber affected is so slight that the restoration will not mar the beauty of the old woodwork.

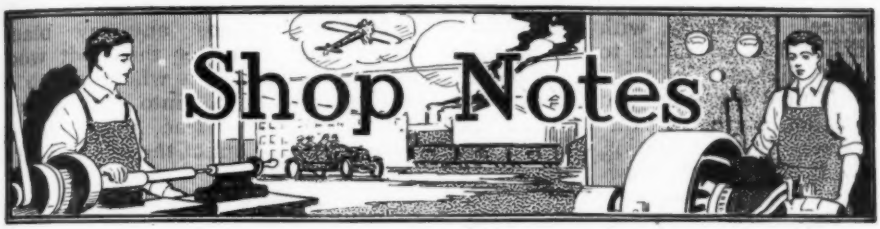
AN ELECTRIC COOKER WHICH SAVES WASTE

A new type of electric cooker, claimed to prevent shrinkage in meats, has been invented in Denver. Designed particularly for hotels and restaurants, it consists of an air-tight oven heated by electricity and equipped with an electric motor and air-compressing pump. The food is cooked by means of circulating air, which, being under pressure, absorbs a minimum of moisture. While the ordinary methods of cooking meat usually result in a loss of more than 25 per cent in actual substance, this cooker is claimed to reduce the shrinkage to eight per cent. The system also allows no flavor to escape, and so retains the choicest savors. Automatic mechanisms gov-



View of Electric Cooker, Showing the Arrangement of Motor, Air Compressor, and Automatic Shut-Off

ern both heat and pressure, and the cooker requires no attention from the time the food is put in until its removal for serving.



Locating a Broken Line in an Igniting Cable

To find a wire broken inside the insulation in a cable is a very difficult job when one does not know how to go about it. Such breaks can be easily located, however, in the following manner: Procure a cheap pocket compass, draw each wire out at some point, separate it from the others and turn a current through it, at the same time holding the compass about ½ in. from the wire. If the current flows through, the needle of the compass will be deflected from normal in one direction or the other, but a broken wire will have no effect on the needle.—Contributed by John McDermott, Turtle Creek, Pa.

Adapting Gas Fixtures for Inverted Lights

When fitting inverted gas lights on certain kinds of fixtures, instead of using goosenecks, use the arms and attach lights as shown in Fig. 1. This will make a better-appearing job than the gooseneck method, as shown in

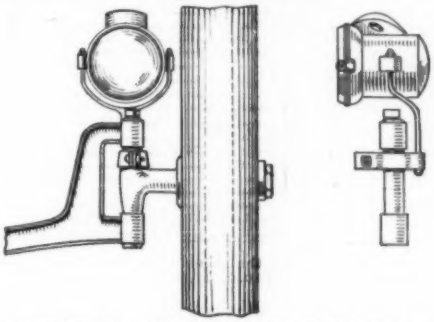
Reversing the Arms of a Gas Fixture to Adapt It for Use of Inverted Lights

Fig. 2. The arms should be adjusted so that there will be no leakage of gas in the joints.

¶The surface of cement floors may be cleaned of oil for making repairs by a few applications of muriatic acid.

Automobile Lights Directed by the Travel of the Wheel

Being compelled to use my motor truck a great deal at night over roads that were none too good, I devised a



Lamp Brackets Attached to the Wheel-Axle Stub so That the Light will Follow the Wheel's Travel

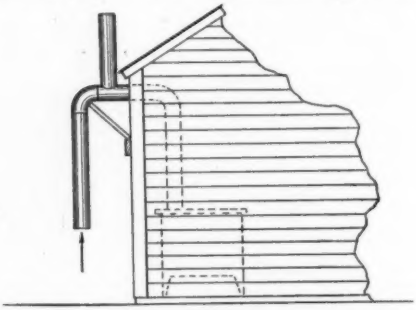
way to attach the gas lamps so that their light would be directed in the line of the front wheels' travel at all times. The Y-shaped brackets which served to hold the lamps were removed from their original position and were lengthened by means of a piece of strap iron, welded to them at the junction of the forks. A clamp of strap iron was then made to fit around the upper portion of the spindle on which the steering stub turns, and to this clamp the lower end of the enlarged bracket was riveted. The clamp was then put in position and the bolt drawn tight, whereupon the bracket was marked and taken off to be bent so that the turning point of the lamp coincided approximately with the axis of the spindle.

The diameter of the lamp was such that it was necessary to revolve the clamp slightly when it was finally put in place to prevent any part of the de-

vice from coming in contact with the wheel. Naturally, with this arrangement, it is advisable to use lamps of small diameter and weight, not because of limited space alone, but because the location is such that they are subjected to very severe vibration.—Contributed by E. F. Hallock, New York City.

Forced Draft for a Kitchen Stove

Having considerable difficulty with the kitchen stove on account of floor draft, I put a few additional lengths of



The Open End of the Pipe Extending Downward Admits Air That Causes a Draft in the Main Pipe

pipe on the main chimney without any marked improvement. I then hit upon the plan shown in the sketch, and it worked so well that the damper in the stove must be used frequently. The additional pipe was placed downward with an open end at the bottom, the upper end being connected with a T-joint, as shown, in the main pipe.—Contributed by W. A. Jaquythe, San Diego, Cal.

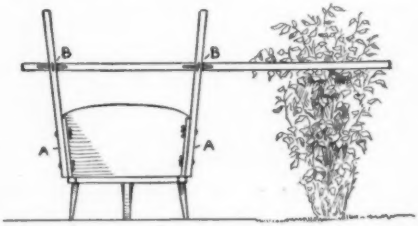
Cutting Thin Tubing

Cutting tubing of brass or steel with a hand hacksaw is very hard on the saw blades. Special blades are made for this work, and are commonly called "tubing saws," in which the teeth are so fine that the section of the metal being cut cannot slip up between successive teeth and break them. However, these tubing saws are not always to be had when one wants them. Instead of them, drive a piece of wood inside the tube, completely filling the hole and the piece can be cut with safety with almost any saw blade. Hard wood is better than soft wood for this work. If a whole length of tubing is to be cut into short pieces, fill the tube with lead, and it can be easily knocked out of the sections after they are cut.

Thin brass tubing or sheet brass may also be cut in another way. Reverse the blade in the frame and begin to saw with the back of the blade. The blade will soon pick up particles of metal and thus roughens up enough to cut quite well. It cuts somewhat on the principle of the friction saw, so commonly used where power is available. It is not a speedy cutter, but where there is only one saw blade to complete a job it is a trick well worth knowing.

Gauge for Cutting Hedges

A great deal of difficulty is usually encountered when cutting hedges and it is almost an impossibility to get a straight line. The attachment for a wheelbarrow, shown in the illustration, makes the cutting a very simple matter. The attachment consists of two uprights, about 2 in. square and 3 ft. long, graduated in inches on one of their surfaces, and an adjustable crossbar. A ¼-in. hole is bored in the center of each piece on each mark. The uprights are fastened to the sides of the wheelbarrow with bolts having thumb nuts, as shown at A A. The crossbar is a piece of material, 1 in. thick, 2 in.



The Crossbar may be of Any Shape to Make a Guide for Cutting the Hedge Tops

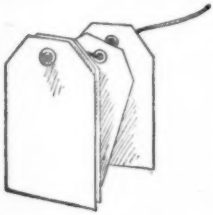
wide, and about 4 ft. long. Two slots, ¼ in. wide and about 8 in. long, are cut in this piece, as shown at BB. This

is to provide for the slant of the uprights. Two bolts with thumb nuts can be used to hold the guide to the uprights.

When cutting the hedge the guide is set at the desired height and the top of the hedge can be clipped off evenly, the wheelbarrow being moved forward as the clipping proceeds. The advantages are evident. The guide is adjustable, and the clipped tops can be thrown into the wheelbarrow. Any shape of guide may be used, which makes it possible to obtain any variety of fancy shapes on the hedge.

Blank-Tag Holder

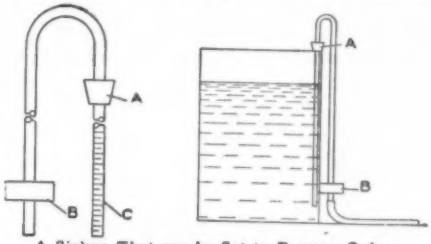
Although a great many tags are used in our store we have never had a good place to keep them, and usually they were placed loose in a box and were not easily found. One day I strung several on a cord and tied a knot in one end and the other end to a nail. The knot was small enough to allow the tag to slip off when pulled and yet large enough to keep them from slipping off by their own weight. —Contributed by Geo. B. Wright, Norwalk, Conn.



A Gauge Siphon

The gauge siphon, as its name suggests, is simply a siphon which enables the operator to determine at all times exactly the location of the end of the tube with respect to the bottom of the tank. A simple sketch of the apparatus is shown. The siphon consists of two rubber corks and a glass rod bent to form an ordinary U-tube, to which a rubber hose is attached.

The cork A simply acts as a bearing on the edge of the tank and a support for the U-tube. The cork B is simply put on the tube to take up the side thrust of the tube, due to its own weight and the weight of the rubber hose. This cork may be used on either tube according to the direction of this side thrust.

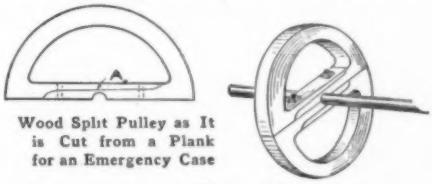


A Siphon That can be Set to Remove Only a Certain Amount of Liquid

A scale, C, might be etched on the tube and a direct reading of the tube's immersion taken. This apparatus will be found practical for use in sieve tests where the residue in the bottom of the tank must not be disturbed, also in oil-storage tanks where it is desired to draw off only the clear oil.

An Emergency Split Pulley

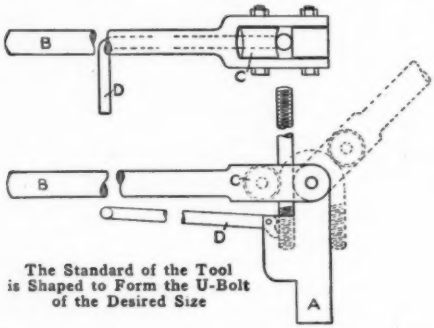
An emergency split pulley can be easily cut from a plank, and if great width is necessary, several planks can be placed side by side. A circle is drawn on the plank the size of the pulley. If the plank is not wide enough place two of them with their edges together. Draw another circle for the width of the rim and cut out the inside, leaving a crosspiece on one side of the diameter or center line. The saw is run into the part to be cut out on the line A. The shaft hole is cut out to fit snugly on the shaft and two holes bored through the spokes for bolts. A pulley can be quickly made in this manner, and it will answer the purpose as well as an expensive pulley.—Contributed by E. Leslie McFarlane, Nashwaaksis, Can.



Wood Split Pulley as It is Cut from a Plank for an Emergency Case

Bending U-Bolts

The bending of U-bolts is easily accomplished with the tool shown in the illustration. The shank of the tool A



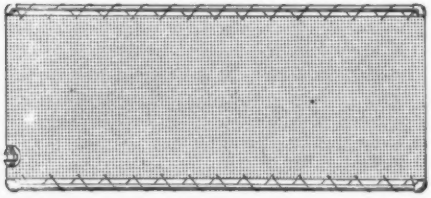
The Standard of the Tool is Shaped to Form the U-Bolt of the Desired Size

is made to fit the square hole in the anvil, and the lever B carries a roller, C, in a semicircular course over the upper end of the support. The lever D holds the threaded stock and prevents its being drawn out of the tool by the action of the bending lever B.

The tool must be made for a special size of stock and for a certain bend and cannot be used to make any other sizes. Sometimes it is necessary to make a large quantity of the U-bolts of one size and then it will save time and expense to make the bending tool.—Contributed by Roy H. Poston, Flat River, Mo.

A Hammock Swing

This hammock swing consists of a frame made of gas pipe and fittings and covered with canvas. The size of the



The Frame is Strongly Made of Gas Pipe and the Canvas Stretched Tightly on It

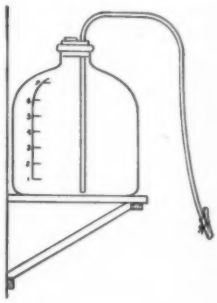
pipe used was ¾ in. in diameter, the two side bars being 74 in. long and the end pieces 30 in. long. The corners were connected with ¾-in. els, and one end piece built up of two parts and one union.

The canvas is 1 yd. wide with a 3-in. hem, the ends lapping over the gas pipe and the sides being fastened as shown.

The hammock is hung with ropes or chains of light steel as desired. A pair of hangers for each end will be required. The chains are used by fastening the ends of one chain in the pair to the corners of the hammock, then the other chain in the center and to the beam above, adjusting it to the height desired.—Contributed by Mrs. J. V. Moore, Seattle, Wash.

Fuel Storage for a Motorcycle

Having a clear glass carboy handy and desiring a receptacle to store several gallons of gasoline for my motorcycle I arranged the carboy as follows: A wood stopper was made for the neck, two holes bored in it, one large enough to pour in the gasoline and the other of a size to admit a piece of copper tubing, about 3½ ft. long. The stopper was placed in the neck of the carboy and the copper tubing was inserted into the small hole so that the end almost touched the bottom. The tubing on the outside was then bent over until the end extended below the bottom of the carboy. A small length of rubber tubing was fastened to this end.



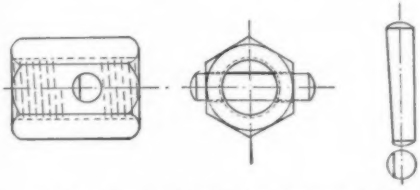
The gasoline was poured in through the large hole with the aid of a funnel and the siphon started by drawing out the air until the gasoline began to flow, then the rubber tubing was doubled and tied with a bit of string to keep the liquid from flowing until it was necessary to fill the motorcycle tank. The carboy was kept on a shelf at the right height. When filling the carboy the

level for each gallon of gasoline was marked on the outside, so that I could determine the amount of gasoline on hand at any time.—Contributed by J. A. Hart, Philadelphia, Pa.

A Stud Driver

The driver consists of a piece of hexagon bar stock drilled and tapped to fit the threads cut on the stud, and a short pin having a flat surface filed tapering from one end to the other and fitted in a hole drilled through two parallel sides of the threaded piece.

In use, the driver is turned on the stud until the flat side of the pin strikes the top end of the stud. The pin is

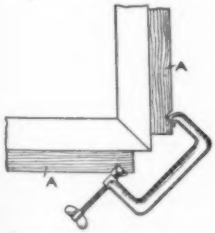


A Driver That is Quickly Attached to a Stud for Turning It into Place

then tapped lightly with a hammer on the large end, causing it to tighten against the end of the stud. A socket wrench of the right size is used for turning it. To remove the driver from the stud, tap the small end of the pin lightly with a hammer and turn the driver in the reverse direction.—Contributed by C. E. Bradley, Fall River, Massachusetts.

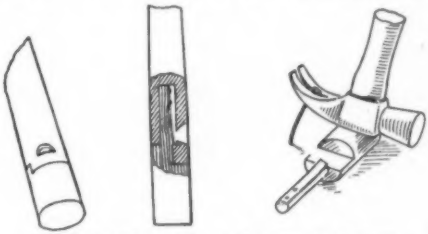
Clamps to Hold Picture Frames

An effective way to glue and clamp a picture frame is to use four narrow strips, two of which are shown in the sketch at A, with their ends notched for the clamps. This will bring equal pressure on all corners. — Contributed by J. M. Adamson, Carey, Idaho.



Block to Assist Hammer in Pulling Long Nails

The pulling of a long nail with a carpenter's hammer requires a block to



Block Attachment for a Hammer to be Used in Pulling Long Nails from Wood

raise the center of the hammer high enough to draw the nail straight at the end. A block not always being at hand, I put one on the handle of my hammer and found it very convenient. The block constitutes the end of the hammer handle and is fastened with a spring clip, as shown, which can be pressed with the thumb when the block is to be taken from the handle and used for pulling a nail.—Contributed by A. S. Thomas, Gordon, Can.

Electric Lighting of Bubble Glasses in a Level

Bore a hole in the end of the level opposite the plumb bubble, large enough to receive a dry cell of battery such as used for flash lamps. Mortise

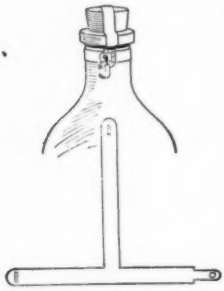
When the Level is Used in a Dark Place, the Light can be Flashed on the Bubble Glass

a space under each bubble glass large enough to receive a small electric globe, and bore two holes for push buttons. The lines for the wires are shown plainly in the sketch. A hole bored through lengthwise will provide a place for the wires. The bubbles can be lighted when the level is used in dark places.—Contributed by Chas. C. Bradley, W. Toledo, Ohio.

¶Old paint worn too thin to burn off may be removed by applying a coat of linseed oil before using the burner.

Locking a Cork in a Bottle

The bottle-locking device shown in the illustration is for use on bottles containing poisons or other fluids that might prove dangerous to anyone not familiar with their nature. A clasp is made of thin metal, as shown by the diagram, which is bent around the bottle neck and over the cork, the tongue end with the round hole being inserted through the slots in the other ends and a small padlock attached in the round hole. The size of the clasp will depend on the size of the bottle.—Contributed by Jos. J. Kolar, Maywood, Ill.



A Paint-Can Hook

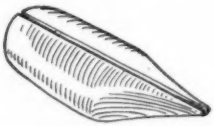
The hook is shaped from a piece of round iron, ¼ in. in diameter and about 16 in. long. The bend in the center which forms the hook part is welded together and the upper end flattened to slip under the siding while the lower end is pointed and made sharp to stick into the wood. The flattened part prevents the hook from turning sideways.—Contributed by Charles Gordon, Philadelphia, Pa.

Remedy for Swelling Feet and Enlarged Pores

Persons who work in boiler rooms or in shops where steam is present are often troubled with swelling feet or enlarged pores. A good solution to be applied which will prevent this as well as the odors of perspiration can be made in the following manner: Mix together 60 parts alum; 10 parts tannic acid; 5 parts salicylic acid; 20 parts starch and 5 parts talcum; add enough water to dissolve them and make a preparation thin enough to apply easily. The solution is harmless and inexpensive. — Contributed by Loren Ward, Des Moines, Iowa.

Oil Spout Formed in a Bottle Stopper

Having occasion to use an oilcan when none was at hand, I constructed a substitute by forming a spout in the stopper of a bottle. An ordinary bottle of the smaller size was selected and a wood stick, about 4 in. long, was whittled to fit in the neck of the bottle. The outer end of the wood was cut pointed, and a V-shaped groove cut in the side from the pointed end to the base. The oil will run along the groove and can be dropped into a bearing as well as with an ordinary oilcan. —Contributed by Arthur Koeppner, Cleveland, Ohio.



Starting a Bolt in a Difficult Place

Recently, while working on an automobile, I found it difficult to get a bolt started in its place, and when I had about decided to remove other parts to enter the bolt, I hit upon the following scheme of overcoming the difficulty. A piece of wire was procured and one end lightly soldered to the bolt head. This served as a handle for placing the bolt and was easily removed by giving the wire a few turns. The same means can be used to enter bolts and pins in places not easily accessible, the time of preparation being small as compared with the practical value of the device. —Contributed by Wm. A. Murry, Cold Spring, N. Y.

How to Make an Engineer's Kerosene Torch

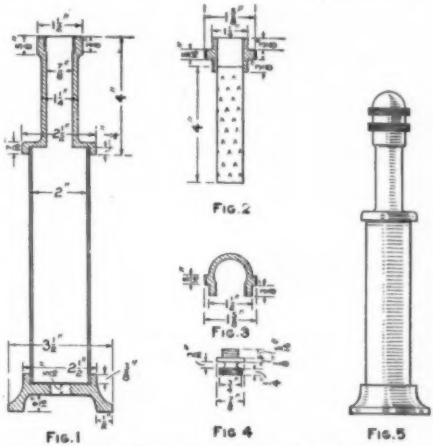
By F. W. BENTLEY, Jr.

A compact, light and strongly built brass hand torch is the pride of the engineer who owns it. However, in the construction of many torches the maker is forced to combat with a few difficulties coincident with the necessary use of kerosene, that sometimes discourages an extra outlay of time and expense in its construction. In the first place the soiling nature of kerosene will prevent the average torch from being placed in a grip or suitcase with overalls or clothing. In the second place, the construction of many torches of this kind is such that the process of filling the oil chamber necessitates a withdrawal of the large wick, which in itself makes the torch only an objectionable necessity.

In the accompanying sketches the construction of a brass torch is explained which will eliminate almost all of the serious drawbacks generally encountered in the use of a kerosene torch. In addition to other merits of its construction, the most important feature is the small expense of making one. Referring to Fig. 1, the shell or body is of 2-in. brass tubing, which can be purchased for about 10 cents per foot. The top piece can be turned out of a piece of 2½-in. brass rod. The bottom piece is also made with but few operations on the lathe out of a piece of 3½-in. brass rod. The part for the wick, and the base are simply sweated to the tubing.

The throat nipple, containing the tin wick casing, is shown in Fig. 2. The wick casing can be either sweated or riveted into the nipple. A small round-nose chisel should be used to puncture the casing in a number of places, the raised tin portions pointing upward on the inside of the casing. This will enable the wick to be drawn upward, but at the same time will prevent it from dropping down into the torch in case the same is accidentally dropped, or receives a sudden jar. The end of the nipple, holding the wick casing, is screwed firmly into the upper portion of the torch, and is taken out only for the renewal of the wick.

The cap covering the upper portion of the nipple when the torch is not in



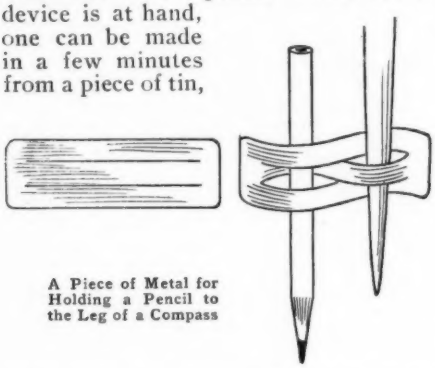
An Engineer's Torch That can be Stored in a Tool Chest or with Clothing without Leakage of Oil

use, is shown in Fig. 3. This covering permits the torch to be placed in contact with anything without danger of soiling it. The filling of the torch is accomplished by the removal of the filling plug in the cupped portion of the lower, or bottom, piece. The details of the plug are shown in Fig. 4. The concave portion of the bottom enables the torch to be filled without spilling and splashing oil. A sketch of the torch assembled, showing its neat exterior appearance, is given in Fig. 5. Of course, the sizes of the several pieces can be varied to suit the requirements of the person for whom it is made, but in the line of a portable torch, using kerosene oil, the points of its construction for durability, cleanliness and inexpensive manufacture will be found hard to excel.

¶If an ignition cable becomes frayed at the ends, one or more strands are likely to come in contact with the metal parts of the magneto, the coil or the car, and cause trouble.

A Pencil and Compass Holder

Carpenters and other workmen have occasion to use compasses in their work and often need to strike a circular line with a pencil. If no other device is at hand, one can be made in a few minutes from a piece of tin,

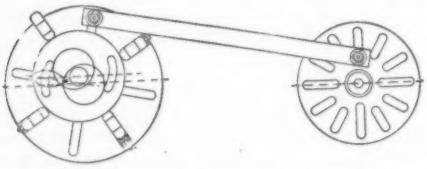


A Piece of Metal for Holding a Pencil to the Leg of a Compass

sheet copper or brass. Take a piece of the metal, ½ by 1¼ in., and make two slits in it, then bend the center piece in an S-shape and the two outside pieces also in an S-shape, but in the opposite direction, and the holder is complete. A compass leg is slipped in one loop and a pencil in the other, and the result is a device that cannot be beaten for utility. The spring of the metal holds the inserted pieces very firmly.

Cutting Eccentric Slots on a Lathe

The method of cutting two eccentric slots in a cam plate on a lathe is shown in the sketch. Two circles are drawn concentric with their respective slots on the cam plate and the slots laid out



Manner of Oscillating the Chuck of a Lathe so That Eccentric Slots can be Cut

and roughly drilled. The plate is then clamped in a lathe chuck so that the center of one circle runs true. A connecting bar is fastened to a stud on the faceplate of a smaller lathe, set in line, so that the other end of the bar can be connected to a stud set in the chuck holding the plate.

The smaller lathe is started and the connecting bar gives a rocking motion to the chuck holding the plate. The adjustment of the studs holding the connecting bar limits the length of the rocking motion. It is only necessary to use an ordinary boring tool to cut the sides of the slot accurately.—Contributed by James H. Rodgers, Hamilton, Ont.

Transferring Photographs to Watchcases

Instructions for making a picture on a watchcase, watch dial, or other similar object, are often sold at a high price and most of them turn out to be a simple carbon transfer, or a process of sensitizing metal which is difficult to carry out. The method herewith given is extremely simple, and with it anyone can do good work from the start, without experience in photography. It makes a perfect, transparent film that appears as if the photograph were taken directly on the watchcase or dial.

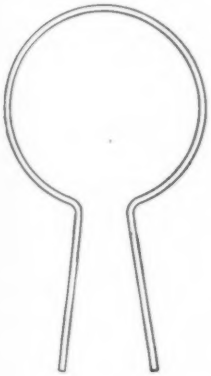
First prepare the following mixture: Collodion, 4 oz.; Vence turpentine, 1 dr.; camphor spirits, 10 drops, and 95-per-cent alcohol, 1 oz. Flow this solution over the photograph that is to be transferred and carefully lay it aside to dry for 15 minutes, or longer, then paste the print, face down, on a smooth piece of plain glass, using ordinary library paste. Allow it to dry for at least one hour, then, with the bowl of a spoon, or a finger, rub the picture from the center out, wetting with cold water until all the paper backing is removed, and place the glass with the picture into a bowl of hot water. The composition will free itself from the glass.

Place the film on a piece of ordinary paper and cut it to the desired size. It is usually best to cut it in the shape of a disk to fit the watchcase. Place this disk back into the warm water, and

the film will soon float while the paper sinks to the bottom. With a solution of gum acacia, grease the case that is to receive the picture, then very carefully place the picture in the right position and attach it firmly by pressing with a silk cloth. The best place to put the picture is either on the inside of the cover or on the dial. If placed on the dial, the picture will show up in every detail, yet the figures can be seen through the picture.—Contributed by J. G. Allshouse, Avonsmore, Pennsylvania.

Piston-Ring Closer

When replacing a piston in the cylinder of a gas engine, it is rather difficult to close the three or four rings so that they will enter the bore. The mouth of most cylinders is countersunk or beveled to facilitate starting the rings, but without assistance, this will be of little help if the rings are new and stiff. Some mechanics tie the rings closed with light copper wire which is removed as each ring starts into the bore.

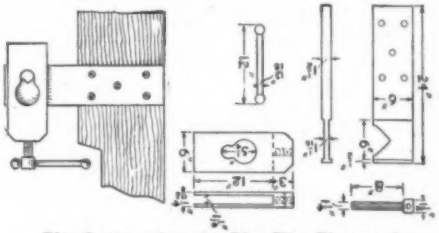


A time and labor-saving tool can be made for this work that will pay for itself in the work on one engine. Secure a piece of metal, $\frac{3}{16}$ in. thick and 1 in. wide, and bend it to the circle of the piston—for a 4-in. piston, the ring should have a 4-in. inside diameter—leaving a gap of about 1 in. and bending both ends back to form handles as shown. With this clamp one man can easily replace cylinder pistons alone and in a short time.

¶A filler for ebony is made of lampblack and plaster of Paris mixed in a paste by using gold size or japan.

An Inexpensive Post Pipe Vise

A pipe vise of any size suitable for holding pipe up to 3 in. in diameter is an expensive and a heavy tool, and,



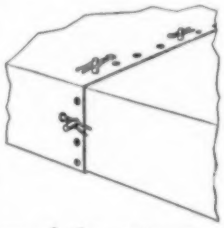
Flat Construction of a Pipe Vise That can be Quickly Attached to a Post

in a great many instances where pipe work of a light nature necessitates only the use of a small pipe vise, a heavy bench or rigging must be carried along to attach the vise to, or a temporary bench must be erected.

A vise that can be very inexpensively constructed and quickly bolted to a post or wall corner of sufficient rigidity to stand the strain of work is shown in the sketch. Its manufacture requires only a few hours' work on the lathe and shaper. Owing to its construction the vise is able to stand a great deal more abuse and heavy usage in rough and hurried work than the finer machine vises intended for use only on the shop bench.

A Rivet Clamp

Rivets that are placed through holes in square or circular sheet-metal work must be held by the protruding end while the stake or mandrel is placed on the head. A clamping device for holding the rivets can be easily made from a cotter that is of suitable size for the rivet. The legs of the cotter are bent to fit the rivet as shown. Several cotters can be shaped to hold as many rivets.—Contributed by Lorin A. Brown, Washington, D. C.



A Paint-Can Opener

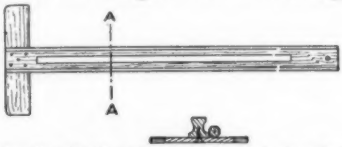
A very handy paint-can opener can be made on the small or upper end of the paint-brush handle. The small end

The End of the Paint-Brush Handle is Shaped to Insert under the Cover Edge

is cut off where it will be large enough not to break easily, and then it is cut wedge-shaped. This is used as a lifting bar to pry off the cover.—Contributed by J. A. Nolan, Woodside, Cal.

Handhold for a T-Square

A large portion of the dirt and smut that accumulates on a drawing comes from handling of the T-square by the blade. One way to avoid the dirt is to fasten a cleat to the top of the T-square blade for a handhold. This will prevent the fingers from coming in



The Handhold as It is Attached to the Top of a T-Square Blade

contact with the drawing, and provides a place for pencils and instruments, as shown in the cross section.—Contributed by W. E. Crane, Cleveland, Ohio.

Starting Holder for a Nut

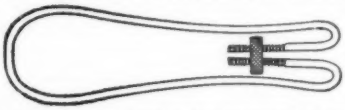
The holder is made of sheet metal, rolled into a tube. A nut is then inserted in one end and the metal hammered to the shape of the nut. Any

The Holder Made of Sheet Metal Grips a Nut to Start It on the Threads

length of metal can be used, as desired. In use, the shaped end of the metal is slipped over a nut and a slight pressure on the other end will hold the nut so that it can be turned on the threads of a bolt in otherwise inaccessible places.—Contributed by John E. Hollarbush, Huron, S. D.

An Adjustable File Handle

The handle is constructed of round machine steel, 1/4 or 3/8 in. in diameter and about 15 in. long, which, when bent over in the shape shown, will leave the handle part about 5 in. long. Before making the bend the ends are threaded with a small die, having the same number of threads as those cut in a 3/4-in. nut. The steel is then bent in the shape



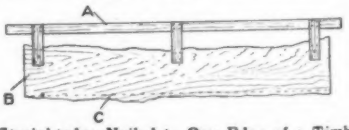
The Tapering Portions of the Threaded Ends are Easily Clamped on the Tool Shank with the Nut

shown, and the inside portion of the threaded ends are filed flat to admit the shank of the tool. A 3/4-in. nut is used on the threads.

The tapering shank on most hand tools can be inserted between the two ends, and the sloping parts are easily clamped on it by turning the nut.—Contributed by G. H. Holter, Jasper, Minnesota.

Sawing the Edge of Timbers Straight

In cutting a piece of timber both edges of which are crooked or jagged, attach a straightedge, A, on one edge



A Straightedge Nailed to One Edge of a Timber to Guide the Other Edge on the Saw

of the timber, B, and the piece can be more easily run through the ripsaw to cut on the line C.—Contributed by Joseph Flood, Philadelphia, Pa.

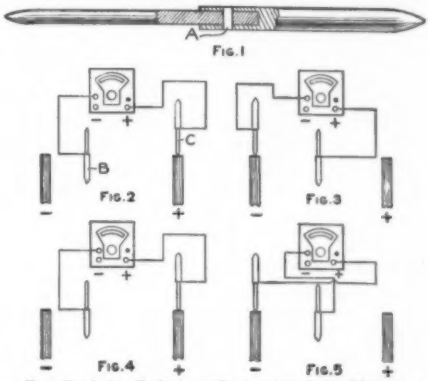
¶ The priming coat of paint should be put on a building before the plasterer begins his work.

How to Test a Storage Battery with Cadmium Contacts

The amateur, in building storage batteries, will often be unable to get the desired results, although the color of the positive and negative plates may be correct and a voltmeter connected across the cell may give the proper indication of the condition of the cell, due to the fact that the plates are not properly formed. When the above conditions exist, it is quite necessary to test each plate separately, which may be done by means of a pair of cadmium contact pieces and a low-reading voltmeter.

These contact pieces, according to Lyndon, should be made as follows: Take a piece of ¼-in. hard copper wire and force it into a hole drilled in the end of a ⅜-in. piece of cadmium. The ends of the pieces of cadmium and copper should now be pointed and a small hole, A, Fig. 1, drilled for the lead to the voltmeter. The center portion of the contact pieces should then be taped to prevent the likelihood of accidental contact with the battery plates. Two such contact pieces are shown in the sketches, but it is not imperative to have two of them, as a piece of copper will serve for one, and a piece of cadmium for the other and they may be interchanged, if the voltmeter readings are reversed.

The total or resultant voltage of the cell may be obtained by placing the copper ends in contact with the positive and negative terminals of the battery. Further readings may be taken as follows: Place the cadmium contact B in the acid and the copper, C, in contact with the positive terminal of the cell, as shown in Fig. 2. If the cell is fully charged the voltmeter should read about 2.30 volts. Now change the copper over to the negative terminal of the cell and the voltmeter needle will go the wrong way, indicating a negative reading; change the connection so that they correspond to those given in Fig. 3, and the voltmeter needle will deflect the right way and give a reading of about .2. The sum of these two readings is then the voltage of the cell which should be 2.50, when the cell is fully charged. When the reading between the cadmium and the negative plate is less than .10, the



Detail of the Cadmium Contact and the Manner of Making the Test on a Storage Cell

cell is not fully charged and the charging should be continued until the proper value is reached.

Readings on a discharged cell may be taken as follows: The potential of the cadmium with respect to both plates is the same and the resultant is found by subtracting one reading from the other. The connections should be made, as shown in Figs. 4 and 5. When connections are made as shown in Fig. 4, the voltmeter should read about 2.05 and when made as shown in Fig. 5 about .25. The voltage between plates then is about 1.8 volts. The cell should never be discharged beyond this point.

Drying Blueprints

A factory where a large number of blueprints are used dries the prints quickly with an electric iron. A table is provided for this purpose, which is covered with a piece of oilcloth, cotton batting, and cheesecloth, in the order named. The iron must not be too hot, as this will ruin the print. This drying method, used in connection with an electric printing machine, makes it possible to turn out a print in about three minutes.—Contributed by J. S. Bray, Indianapolis, Ind.

Protecting the Edges of Concrete Curbing

The edges of concrete curbing may be protected against chipping by means of iron rods or tubing placed in posi-

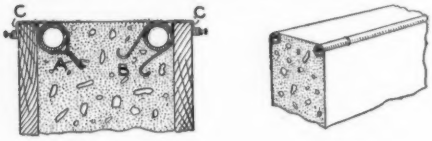


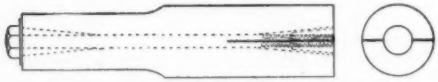
Fig. 1 Fig. 2

The Edge of the Curb is Protected with a Piece of Pipe Anchored in the Concrete

tion as shown in the sketch. The anchoring wires are shown in Fig. 1, A being the twisted type and B the hairpin anchor. The rods are held in the forms while the concrete is being poured with wires CC, which are cut close when the forms are removed. The finished curb is shown in Fig. 2.—Contributed by James M. Kane, Doylestown, Pa.

Cup-Valve Extractor

An extractor for removing carbonized cup valves from an air compressor may be made from a piece of wood, as shown in the sketch. Procure a piece of hard wood, about 12 in. long, 2½ in.



The Ends of the Wood Expand on the Cup in the Manner of the Lathe Chuck

in diameter on the large end and 1¾ in. in diameter on the small end. The size of diameter depends somewhat on the size of the valves. A hole, $\frac{7}{16}$ in. in diameter, is bored lengthwise through the center to admit a ⅜-in. bolt, 12 in. long, with 3 in. of thread on each end. Both ends are bored out tapering as indicated. These are to receive round, tapering wedges of iron or brass which are threaded to fit the bolt. Two saw cuts are taken through the center of each end, at right angles to each other, to prevent splitting the wood when the wedges are drawn in place.

The end that fits the valve is inserted, then the bolt adjusted to expand it. The wood gives ample hand hold to work the valves loose. The bolt and wedges can be reversed as desired to use either end of the stick.—Contributed by A. H. Harrison, Los Angeles, Cal.

Pointing Pickets

The easiest and quickest way to point small lots of pickets is described by a correspondent of the Wood-Worker. The method is to cut out the shape of a picket from a board and nail on a side and end strip for a stop as shown in the sketch. Drive two brads through from

Pattern Form to Hold Pickets While Pointing Them on the Cutter of a Shaper

the under side and sharpen the points. These will help the stops to hold the piece in the pattern. The pattern and picket is run on a straight-wing cutter on a shaper, allowing the pattern edge to run against the collar.

Removing Tin Roofing

Having a large amount of tin roofing to remove, I made a tool, as shown in the sketch, to cut the metal at the seams, thus allowing the sheets to be taken off in sections. The tool is shaped like an ordinary can opener, except that it is a little larger and the handle longer. A wire and cross handle are attached so that a boy can draw the tool while a man guides it through the tin. The cutter is made of tool steel, and hardened. The tool can

The Cutter is Made Similar to and Used in the Same Manner as a Can Opener

be used for cutting stovepipes, for furnace jobs and on many other kinds of tin-shop work.—Contributed by E. S. Sites, Muncie, Ind.

An Elbow Pattern

By J. A. SHELLEY

Elbow patterns are considered by pattern makers generally as rather a mean job; this is particularly so when, for reasons of economy, it is not deemed best to turn them, and they must be finished by hand with a spokeshave. To make an elbow pattern with the least outlay of physical energy requires extreme accuracy in building. The segments should be carefully planed to the proper thickness and sawn to the exact radii so that, when the circles indicating the diameter are laid out on the ends, there will be no excess of stock.

A study of the layout for the 18-in. special elbow, illustrated in Fig. 1, will disclose several interesting constructive features. The end view of the head, Fig. 2, shows all the segments in place, numbered from 1 to 5 and starting at the bottom, or joint, on each side. It will be seen that No. 5 is made in two pieces, sawn exactly on the center line, and fits between the segments marked 4. This prevents the destruction of the center line and eliminates the feather edges that would result if No. 5 were glued on top of No. 4. The plan shows the segments to the left of the center segment removed and the location of the three heads to which the segments are nailed and glued. It is well to have a good straight surface on which to build the first half. Start by fastening the heads securely to this surface and then put on the segments. For the inside, or shorter radii, these may be in one piece, but for the outside it will be more economical to divide the alternate courses into twos and threes.

In getting out the heads and segments, be sure to have enough for both halves, and dowel the end heads together with two pins in each. The second half is, of course, built on the joint of the first. The prints are built up of segments, as shown in the sectional view of one end of the pattern, Fig. 3, and fastened to the heads with glue and screws. The flanges, with the straight part of the pattern, are built up and turned together and fitted over the prints, to which they are fastened with screws from the inside.

The constructive details of the frame core box are fully shown in Fig. 4. The outer curve A is made in two pieces, fastened together with a half lap joint, and the inner B, in three pieces, which are fastened in the same way. The crosspieces at the ends are halved into these, and the heads fastened to them with screws.

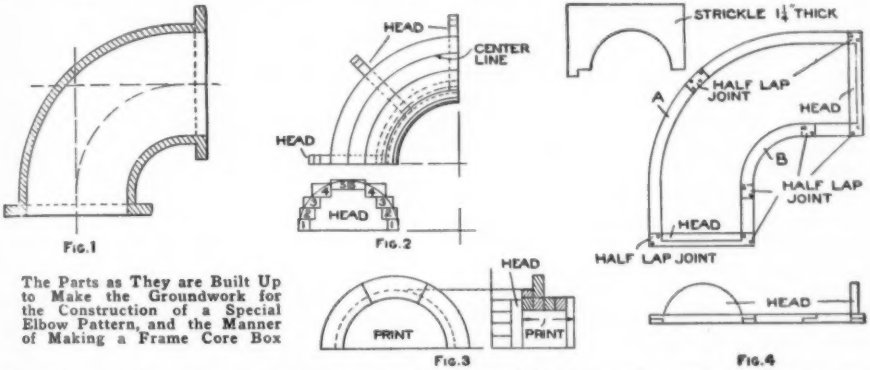


Fig. 1 Fig. 2 Fig. 3 Fig. 4

The Parts as They are Built Up to Make the Groundwork for the Construction of a Special Elbow Pattern, and the Manner of Making a Frame Core Box

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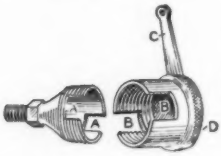
¶ White marks on mahogany caused by dampness may be removed by rubbing the surface with a soft cloth moistened in a little sweet oil. Rub it in well.

An Auxiliary Air Valve for Gasoline Engine

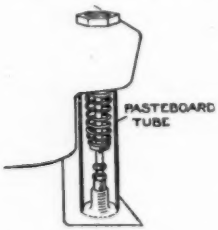
An auxiliary air valve for increasing the power and decreasing the gas consumption of a gasoline engine can be made of an ordinary grease cup, and it will do the work as well as an expensive valve. Procure a 1¼-in. hard-grease cup and cut the slots AA, allowing about one and a half thread intact at the bottom. The slots BB in the upper part can be cut deeper, but in either case each pair of slots should be exactly the same depth. The connecting bar C is riveted to the back of the grease cover D, for turning it.



The end of the lower part is screwed into the carburetor intake pipe just below where it branches off to the various cylinders, and its position can be arranged as desired by tightening or loosening it a little. Upon acquiring a traveling speed of, say, 15 miles an hour, with the valve closed, the traveling speed may be increased in varying degree by opening the valve more or less.—Contributed by Frank C. Barks, Denver, Colo.

Inclosing a Valve Action

Many owners of old automobiles would be glad to know of a way to silence the open-valve action on the motors and prevent the dust and dirt from entering. One of these owners, a correspondent of the Automobile, effectively accomplished this by using a paper tube slipped over the valve stem and spring, as shown in the sketch. The tube may be a piece of one used for mailing drawings, blueprints or calendars, cut to the right length to make a tight fit lengthwise, and then split for its full length, whereupon it is sprung around the stem and spring. A light hose clamp will hold it in place. The tube may be painted black or covered with aluminum paint, after it is thoroughly coated, inside and out, with shellac varnish to make it waterproof.

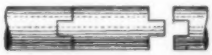


How to Find a Crack in Metal

Clean the surface of the metal, turn on a small quantity of kerosene and allow it to stand for a minute or two, then wipe off the oil and strike the piece a sharp blow with a hammer. The oil will show along the outline of the crack. The jar caused by the blow of the hammer will drive the oil out of the crack to the surface of the metal.—Contributed by J. F. R., Bethel, Vermont.

Repairing a Broken Bicycle Crank

Having broken the locking part on the two-piece crank of my bicycle I decided to fix it rather than buy a new one. Both ends of the shaft part having the locking device were cut off about ¼ in. from the end and slotted as shown. A piece of round steel with a projection on each end to fit into the slots was cut to make the shaft part of the hanger of the right length when the piece was in place. A hole was drilled through the center of the piece to admit the holding bolt. The notches in the ends of the shaft should receive the projecting ends of the center piece snugly so that the three pieces will turn as one.—Contributed by J. E. Nyberg, Jacksonville, Fla.



¶In painting a smokestack with the use of regular oil paint and not asphaltum varnish it would be well to thin the paint with fish (menhaden) oil, which possesses considerable drying quality and withstands considerable heat.

Practical Telephony

By HAROLD HINTON

PART VII—Telephone vs. Telegraph for Train Dispatching

Train dispatching, prior to 1850 when telegraphy was first used on the Erie Railroad for this purpose, was very simple and very slow. The trains were run on a "time-interval system" which allowed the ruling train the right of an hour against any opposing train of the same class. Therefore, if one train was late, all the other trains on the division were late also. The lost time was partly recovered by advancing under the "flag system" whereby a flagman was sent ahead and the train followed after him. When the first man was tired he would wait, on a straight stretch of track, for the train to catch up with him and another man was sent ahead. This method was slow and very unsatisfactory, even in the days when there were no trains that could run at the rate of 70 or 80 miles an hour, so in 1850 Charles Minot, then superintendent of the Erie Road, adopted the telegraph for train dispatching. The troubles which he had with his train crews to get them to take orders from the station agents after they had been sent out by the dispatchers, are a matter of record, but at last a great step in advance had been made in the dispatching of trains even with the comparatively crude instruments of that day.

In 1875, when the telephone was invented and finally used for long-distance communication, the operators on the railroads had used the Morse code so long that they considered it the proper method of dispatching trains. They were inclined to "let well enough alone" and could not bring themselves to adopt the telephone for this kind of work.

In 1883, however, the New Orleans and Northeastern adopted the old magneto telephone for operating trains over a section 100 miles in length. This was a crude system, but it was also a step in the right direction, for, in the latter part of 1906 and the early part of 1907, a few installations of telephone and selector equipment were given a fair, practical trial, and in October, 1907, the New York Central installed an equipment of this description on a 44-mile section of its main line having 16 stations. This installation was the first of its kind and in December, 1907, the Chicago, Burlington and Quincy equipped 46 miles of double track in the same way. These roads are properly entitled to the honor of being the pioneers in train dispatching by telephone.

Statistics show that there are now 14 railroads in the United States and Canada which have telephone circuits over 1,000 miles of line, the total equipment of these roads including more than 35,000 miles of telephone circuits; the total number of the roads having some telephone circuits being in the neighborhood of 75 with a mileage of almost 50,000 or nearly one-sixth of the entire railroad mileage in the United States and Canada. More systems are being laid out very rapidly and it is only a question of a few years when telegraphy for train dispatching will be a thing of the past, but the equipment will be retained for use in an emergency if the telephone circuits are in trouble, as no system is infallible and naturally the telephone with more complicated mechanism is just as liable to failure as was the telegraph, and it is absolutely essential to any railroad that its means of communicating with its trains must be uninterrupted.

The advantages of the telephone for dispatching are many, a few of them being as follows:

The average telegrapher seldom attains a sending speed of more than 20 to 30 words per minute, while with the telephone a speed of upward of 100 words a minute is attained, and the speed is limited only by the ability of the operator to copy the message.

Experience has shown that seven or eight orders may be sent out in one hour by telegraph, while more than double that amount may be sent by using the telephone, the greatest gain being made in repeating the order for the dispatcher's O. K.

A greater speed also is obtained in reporting the arrival, passing, and departure of trains. In most systems the dispatcher is always on the wire and the operator simply removes his receiver, makes sure that the line is not busy and calls the name of his station. The dispatcher calls "dispatcher" and the report is given.

In reporting accidents, etc., the report is so complete, concise, and speedy that the chance of a misunderstanding is eliminated.

By equipping trains and train crews with portable telephone sets the conductor can get into immediate communication with the dispatcher instead of having to get to the nearest telegraph office or station to send in his call for help.

Some systems are so equipped that the semaphore signals at sidings are operated in connection with the selector, so that the dispatcher may set the semaphore against the desired train and have the conductor call for orders.

When calling, the ringing of a bell at any station may be caused by the dispatcher by turning a button which corresponds to the station wanted. This is accomplished by means of a selector. A few seconds after the station bell is rung, the dispatcher's bell rings and shows the dispatcher that the station wanted has been called.

With the aid of the telephone there is more time for the dispatcher to figure out meeting points, etc., and the saving in time in transmitting orders reduces considerably the mental and physical strain of trying to keep traffic moving and at the same time operating the key continually.

The telephone places the dispatcher in closer touch with his operators and a "call-down" over the telephone is taken in better part than when sent over the Morse route. The latter is a cold, bare statement while the former gives more of the conversational quality to the order and has a good deal to do with keeping the force in the healthy frame of mind which is necessary to make it efficient.

The chance of misunderstanding is almost entirely removed.

In case of emergency, men may be taken from other departments to assist in the transmitting of orders, as they, of course, do not have to understand the Morse code.

A field is open for old operators who are first-class, except for "telegrapher's paralysis," as they do not have to use the hand.

The Installation

The wire which is considered standard by most of the roads is No. 9 gauge hard-drawn copper with which the limit of transmission is about 500 miles. Number 8 gauge copper gives a range of about 900 miles, and No. 8 gauge iron wire has a range of about 145 miles.

Before stringing in new wires, a record should be made of the use of the existing wires on the poles, so that inductive disturbances may be overcome by proper transposition. As in other telephone work, transposition should be made about every 1,300 ft., although every half mile will sometimes do the work. Care must be taken to keep telephone wires as far as possible from quadruplex telegraph wires on the same pole.

The selector is, of course, the most important part of the dispatcher's equipment and the success or failure of the whole system depends upon it. There are many styles in use and most of them are giving very good service. The clock system is probably the most popular and the best all-around selector. This system consists of a number of clocks, exactly alike, at each station, and a master clock in the dispatcher's office. The master clock has a dial upon which is mounted a lug and a push button for each station. An arm is fastened to the main shaft of the master clock so that, by turning

the shaft, the arm makes connection with the various stations and when the desired position is reached the button is pressed and the call is made.

The operator's set, as used on most of the larger eastern roads, consists of a regular telephone operator's common-battery breast transmitter and head receiver. This apparatus allows the dispatcher to keep both hands free to move his numbered markers (which represent the trains on his division) about the board which represents the track, sidings, etc., and before which he works, as the reports come to him of their movements along the line.

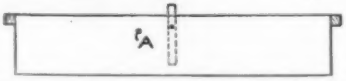
(To be continued)

Setting a Band Saw

In setting a band saw one is liable to have the first few teeth set a little too wide. To overcome this and have the teeth all in line I use the following method: When putting the band saw on the wheels I put it on upside down, so that the teeth will point upward. Then it is tightened until the saw set is drawn to the right width, whereupon the wheels are turned slowly by hand until the saw has made one complete turn. This will put any teeth in line that were out and save the trouble of using the set to draw them back a little.—Contributed by Ernest J. Dickert, Niagara Falls, N. Y.

Lock for a Bench Drawer

The bench drawer can be easily supplied with a lock that will answer the purpose and protect the workman's tools from the borrowing mechanic. The lock consists of a piece of 1/8-in. flat steel that will fit loosely in a vertical position in the drawer. About one-third of the way from one end drill a hole in the piece and fasten it with a nail or screw on the inside surface of the front part of the drawer. Another screw, A, is turned in where it will catch the longer end of the metal, and when the latch is turned over on this screw it will be out of the way. A

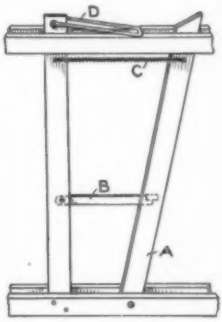


The Lock Consists of a Strip of Metal Attached to the Inside of the Drawer Front

scale or piece of flat steel inserted between the bench top and drawer will turn the latch so that the drawer can be pulled out.

An Automatic Closing Stanchion

A practical stanchion that will close automatically by the action of the beast when placing its head through the bars is shown in the sketch. The stanchion is made in the ordinary manner except that it is equipped with the self-closing parts. When turning the stock out, the bar A must be thrown to one side and to set the stanchion after this is done, it is only necessary to place the piece B as shown, so that the coil spring C will hold it in position. When the beast enters, its movement of the head downward trips the piece B, the spring locks the bar A under the loop D, and the stanchion is securely closed.—Contributed by Ralph Crane, Ypsilanti, Mich.

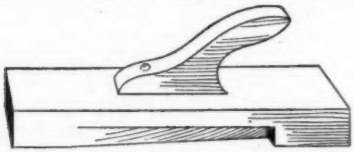


Mending Broken Oilstones

A broken oilstone can be repaired so that it will last until the stone wears out, in the following manner: The pieces are first heated on an iron plate to remove all oil, then thoroughly cleaned. The surfaces to be joined are well dusted with powdered shellac, which is melted by heating in the same manner. The parts are then placed together and tightly clamped until they become cool. The joints thus made will not interfere with the cutting surface.

Gauge for Sawing Wedges

The gauge is for use in connection with the gauge on the circular-saw table. The saw gauge is set the width



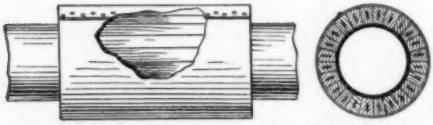
Gauge to Hold Stock on a Saw Table to Cut Wedges for Stair Building

of the wedge gauge plus the thickness of the wedge at the small end. The stock is cut to the length of the wedges and reversed each time a wedge is cut, to keep the grain of the wedge running straight.

The gauge will aid in cutting wedges of all kinds, but it is specially adapted for cutting them for stair construction of the housed-in type.—Contributed by Ernest S. Yawger, Ithaca, N. Y.

Repair Joint for Large Pipe Lines

The joint illustrated is one that I have used for some time in making repairs on pipe lines of various sizes and under all kinds of conditions. The band surrounding the joint is made of metal, about No. 14 gauge, the diameter being 2 in. larger than the pipe. If the metal band is not over No. 14 gauge, it can be sprung around the pipe and forced back to the size with a chain. Holes are punched along the edges for a double row of rivets which are put in and hammered down, using a 1½-in. bar of steel as a dolly. The



A Joint Made in a Pipe Line by a Band Filled in with Wood Strips and Wedged

bar will easily slip in between the band and the pipe.

When the band is in place and riveted over the joint, make some wood strips, ⅞ in. thick by 1 in. wide and as long as the band, the length of which will depend on the joint being covered. The strips should be sawed on a bevel as shown, so as to fill the space between the band and the pipe as closely as possible. After the strips are driven in, split the ends of each strip slightly with a chisel and start wedges in the splits all around, but do not drive them in tightly. Then drive each wedge equally until the strips are all tightly wedged together. Wedge the other end in the same manner, then slightly split the ends of the strips in the opposite direction or at right angles to the other split and across the wedge. Drive wedges in these splits in the same manner, to close up any space between the wood and the metal. Do not drive any wedges between the strips, or between them and the metal.

If heavy band metal must be used for a large pipe, make the band in halves and offset the joint so that the inside surface is smooth. I have used these repairs under 1,000-ft. head without a leak. Also on a long line of pipe drawn apart for a considerable distance, a long band was used and a perfect joint made. Care should be taken to secure straight-grained wood for the strips. I find a repair of this kind can be made where the water cannot be taken out long enough to make a lead joint, and where no supplies are available.—Contributed by Geo. A. Nihell, Goodyears Bar, Cal.

Remedy for a Kicking Cow

Provide two straps similar to a hame strap and buckle each one just above the cow's hoof. Slip a small ring over each strap before they are buckled in place. These will do no harm to the cow if they are left in place all the time. At the milking place have a strap, 12 or 15 in. long, with a snap in each end and fasten it to the rings in the straps on the cow's feet. The cow cannot raise either foot in an effort to make a kick. This only takes a moment's time to attach, and it saves a bruised bucket or the skin of the milker.—Contributed by R. C. Bowden, Magazine, Ark.

How to Attach False Centers

A piece of hardened steel having no centers cannot be ground perfectly by holding it in a chuck. False centers, that will provide a way to grind the surface for the full length, may be attached as follows:

If a piece of hardened steel, 6 in. long and $1\frac{1}{64}$ in. in diameter, is to be ground, proceed to polish each end, then solder a piece of cold-rolled steel on this polished surface, as shown in the sketch. Place the steel in a steady rest on the lathe and center each end

Soft-Steel Ends Soldered to a Hardened Piece of Steel to Provide Centers

in the usual way. These centers serve to hold the steel while grinding the surface, and then they can be removed by striking them with a hammer.—Contributed by Chas. Homewood, Cedar Rapids, Iowa.

How to Make a Pair of Fiber Pliers

A pair of pliers, that will be found to be very useful to anyone that is called upon to handle "live" wires, replace "blown" cartridge fuses in difficult places, such as behind switchboards, or in "live" circuits where there is no switch to open the circuit while replacing the fuse, may be constructed from some heavy sheet fiber. The general appearance of such a pair of pliers

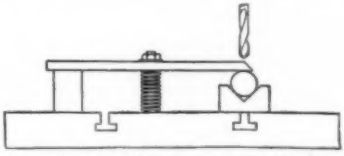
The Parts Forming the Handles and Jaws of the Pliers are Made of Heavy Sheet Fiber

is shown in the accompanying sketch. Grooves may be cut in the jaws so that the object to be handled may be easily held.

¶Ordinary calcimine may be made somewhat waterproof by the addition of a little phosphate of soda.

Spring on a Faceplate Clamp

The ordinary clamp for holding work on a faceplate may be easily fixed to lift its jaw automatically from the work



The Clamp Jaw is Raised from Its Holding Position by a Coiled Spring around the Bolt

when the nut of the bolt is loosened. All that is necessary to make this possible is to place a coil spring over the bolt beneath the jaw, as shown in the illustration. The spring also keeps the jaw from turning or changing its position when the nut is released.—Contributed by N. C. Danielson, Moline, Illinois.

Motorcycle Cleaner

No doubt all riders desire a clean motorcycle, but unless the machine is frequently cleaned of dirt and grease, these are apt to accumulate to an extent that discourages further endeavor in this direction. A correspondent of Motorcycling describes a cleaner made by filling a tin can with a coil of lamp wicking which may be used without soiling the hands. The wicking is soaked in kerosene. When not in use the lid is placed on the can to keep it clean until required.

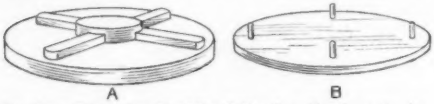
Plug-Cock Lubricant

A good lubricating mixture that will prevent leakage, for use on plug cocks, is made of 1 lb. of suet and ½ lb. of beeswax, melted together. Mix thoroughly while hot, then strain and set away to cool.

¶A well cleaned talcum-powder can makes a good receptacle for flour of emery.

Block for Setting Castings in a Lathe Chuck

Having a quantity of flange castings to face on one side, true with the back, it was necessary to provide some quick

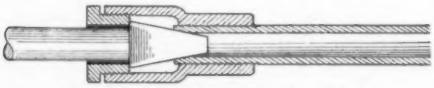


Backing Piece for Rapidly Adjusting Castings to be Turned in the Chuck on a Lathe

way of setting them in the lathe chuck. The back side of the casting, with the four lugs, is shown at A in the sketch. A universal chuck was used on the lathe, in which, of course, a single turn of the wrench would tighten and loosen the grip. To level them up by the back, a disk 1/8 in. less in diameter than the flanges was cut out of a 3/8-in. maple board and four 1/4-in. pins were driven in, as shown at B, all being of the same length. These pins projected through the back of the board a trifle and were brought to a common level by fitting on a surface plate. The block fitted loosely in the chuck jaws and between the chuck face and the pieces to be trued up. All that was necessary to set up a flange was to place it in the chuck and tap it back against the pins.—Contributed by Donald A. Hampson, Middletown, New York.

An Extension Carpenter's Bit

When doing plumbing work or electric installation it is sometimes necessary to use an extension bit and many times the workman does not have one of the proper size at hand, says Electrical Review. A temporary affair can



Pipe Connection Used to Make Any Length of Extensions for an Ordinary Carpenter's Bit

be made in emergency cases from a piece of 1/4-in. pipe, a 3/8 to 1/4-in. reducing coupling, and a 3/8-in. bushing. The thread on the pipe is cut quite long so that the end will extend slightly into the coupling. The end is then squared to receive the end of the bit. The bushing is cut in halves and placed over the shank of the bit, which, when tightened, will hold the bit solidly in the coupling. Any length of pipe may be used, also any size of bit, which makes this extension very desirable.

Keyway-Cutting Tool for the Drill Press

Chipping and filing keyways in holes, 5/8 in. in diameter and under, is slow and unsatisfactory work without machinery or special tools. A simple tool for the drill press can be made to do this work far better than by hand. The tool consists of a piece of cold-rolled steel to be held in the drill chuck, one end of which is drilled and tapped for the cutting tool and its setscrew. The lever on the drill press is used to force

Tool to be Placed in a Drill-Press Chuck and Used for Cutting Keyways

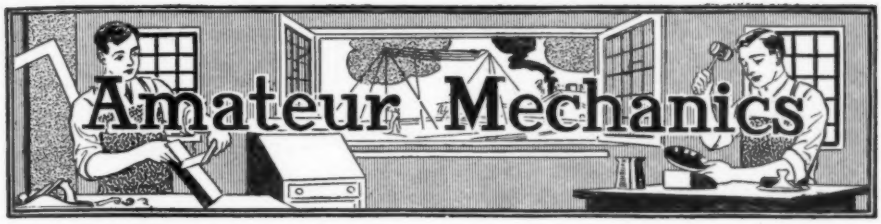
it down through the work. After each cut the tool is driven out a little until the desired depth of the keyway is cut.

A White Paint for Boats

A government formula for a white paint to use on the outside of a boat is as follows: The proportions of the pigment and fluids are varied to suit the requirements. The formula is given for the first coat, which is the thickest. White lead in oil, 7 lb.; zinc white in oil, 7 lb.; raw linseed oil, 2 qt.; turpentine, 2 gills, and japan drier, 1 gill. This will make 1 gal. of paint. If too thin, add more lead and zinc, and if too thick, add more liquids.

Hose Clamp Used on a Small Hose

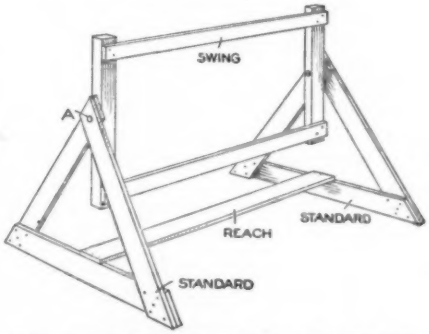
An ordinary hose clamp of usual dimensions can be used on pressure hose of much smaller diameter, if a piece of garden hose is forced on the end of the smaller hose. The clamp can then be drawn up on both so that there will be no leak.



How to Make a Hurdle

The hurdle consists of two standards, a reach, and a swing. The swing is first made in the shape of a rectangle of four pieces of wood, about 7/8 in. thick and 1½ in. wide, of which two are 36 in. and the others 18 in. long. These pieces are nailed together in the manner shown.

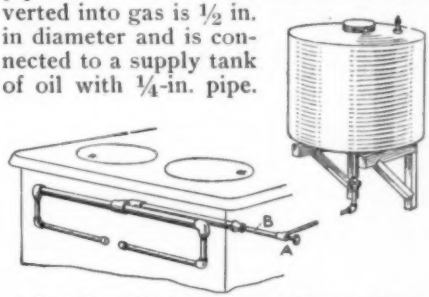
Each standard is made of three pieces of wood, 7/8 in. thick, 3 in. wide, and 18 in. long. Nail the pieces firmly together, as shown, and connect their bases with another piece of the same material, 36 in. long. When this is finished, connect the swing to the standards with long nails, A, at the ends slightly off center. Before inserting the nails, make the holes in each standard to receive them large enough to permit the nails to turn freely without allowing the heads to pass through. Thus the frame will swing freely at the slightest touch of the jumper's foot, and right itself immediately. — Contributed by C. C. Fraser, Saginaw, Mich.



The Swing of the Hurdle will Turn When Slightly Touched and Right Itself Again

Oil Burner for a Cook Stove

The parts of the burner consist of ordinary gas pipe and fittings. The pipe in which the kerosene oil is converted into gas is ½ in. in diameter and is connected to a supply tank of oil with ¼-in. pipe.



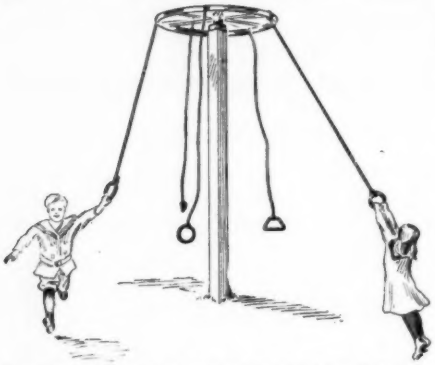
A Very Cheap Grade of Kerosene Oil can be Used in This Burner with Success

The burner part is also constructed of ¼-in. pipe having three 1/16-in. holes drilled in each end for the gas to escape where it burns. These burners are located just beneath the large pipe so that the flames will heat it and convert the oil into gas. A needle valve, A, is used to control the flow of oil. The burner is placed in the fire box of the stove, and the pipes connected through a hole drilled in the stove door, at B.

The tank may be rectangular or round and should be of sufficient strength to withstand 5 or 10 lb. of pressure. The top of the tank has a pet cock where a connecting hose from an air pump may be attached. The tank is filled about half full and just a little pressure of air is put on the oil. To start the burner, run a little oil in a pan or fire shovel and light it so that the flames will convert the oil into gas in the large pipe, then turn the valve A and regulate the flame.—Contributed by Robert Hays, Siloam Springs, Ark.

A Merry-Go-Round Pole

An inexpensive merry-go-round can be made of a single pole set in the ground where there is sufficient vacant



The Ropes being Tied to the Wheel Rim will Easily Turn around the Pole

space for the turning of the ropes. The pole may be of gas pipe or wood, long enough to extend about 12 ft. above the ground. An iron wheel is attached on the upper end so that it will revolve easily on an axle, which may be an iron pin driven into the post. A few iron washers placed on the pin under the wheel will reduce the friction.

Ropes of varying lengths are tied to the rim of the wheel. The rider takes hold of a rope and runs around the pole to start the wheel in motion, then he swings clear of the ground. Streamers of different colors and flowers for special occasions may be attached to make a pretty display.—Contributed by J. Bert Mitchell, Wichita, Kans.

A Theatrical Night Scene with the Appearance of Fireflies

Use small shining Christmas-tree balls, about the size of a hickory nut, strung on strong black linen threads. The thread is put loosely over a hook at the back of the stage among the evergreens that are used for the background. The ends of the threads are brought, like a pair of reins, to the front of the stage, diagonally, and there manipulated by some one in a wing near the front, standing high enough to prevent the threads from touching the heads of the actors. These bright little particles darting back and forth among the trees appear very lifelike, and with the addition of a crescent moon just peeping through the trees, the likeness to a summer night is quite striking.

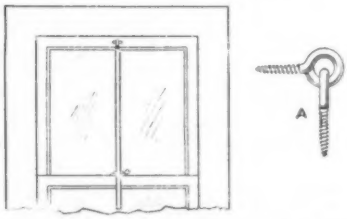
The moon effect is made by using a piece of dark cardboard, about 2 ft. square, covered thickly with small green boughs, and by cutting a crescent-shaped opening in the center, covering it with yellow tissue paper. This cardboard is placed well back in the trees and a lantern hung behind it.—Contributed by Miss S. E. Jocelyn, New Haven, Conn.

Hulling Walnuts

Procure a barrel that is water-tight and mount it on a shaft so that it runs between standards like a barrel churn. Fill the barrel about half full of walnuts, cover them with water and throw in a small quantity of gravel as grinding material. Close the opening tightly and turn the barrel for about 20 minutes. The walnuts will come out clean and smooth as glass.—Contributed by Arthur Seufert, The Dalles, Oregon.

Stick for Lowering Top Sash of a Window

To make it easy to raise and lower the upper sash of a bathroom window which is behind the bathtub I devised



The Stick is Fastened to the Window Sash with Screw-eyes and is Always Ready for Use

the following: Procuring two screw-eyes I opened one sufficiently to slip it into the other as shown at A. Then

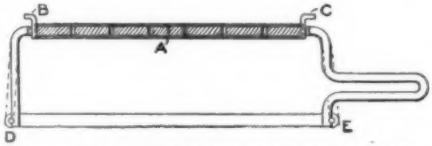
one was screwed into the top rail of the sash and the other into the end of a light stick a little longer than the length of upper sash.

The device is left on the window permanently and affords a ready means of handling the sash without stepping into the bathtub, which would otherwise be necessary.—Contributed by W. E. Morey, Chicago.

An Adjustable Hacksaw Frame

The frame is constructed of cold-rolled steel, 1/4 in. in diameter and 17 1/2 in. long, bent into the shape shown and then cut in two parts at A. Starting at a point about 5/16 in. from the ends made by the cut, drill 1/8-in. holes, then space three other holes 1 in. between centers and drill them 1/8 in. in diameter.

A piece of steel tubing, 1/4 in. in inside diameter and 6 3/4 in. long, is notched on the ends to receive the pins B and C. Slots are cut in the ends D and E, to admit the blade of a saw,



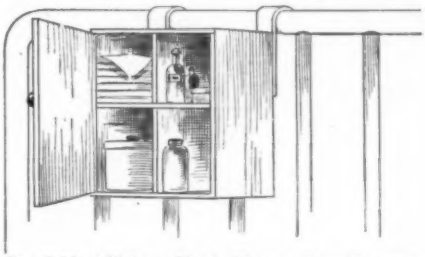
The Frame is Shaped of Cold-Rolled Steel and Made Adjustable with a Piece of Steel Tubing

and half-round notches filed on the outside surface for holding pins used in the hole of the saw blade. The spring of the steel will be sufficient to keep the saw blade in place. The 1/8-in. holes in the frame will permit adjustment for different lengths of blades.—Contributed by Clarence B. Hanson, Fitchburg, Mass.

A Bedroom Cabinet

The cabinet shown in the illustration can be made an ornament with a little care in workmanship and a choice selection of materials. The cabinet may be either fastened to the head or foot of the bed, facing in either of two directions.

The size of the cabinet will depend on the choice of the maker, and if the bed is brass, the wood can be finished



The Cabinet Makes a Handy Place to Keep Necessary Articles for a Sick Person

natural and fitted with brass bands for brackets and holding clips.—Contributed by W. E. Crane, Cleveland, O.

A Dull Black for Cameras

Such parts of a camera that are apt to reflect light must be covered with a dull black. A mixture for this purpose is made of lampblack, about a teaspoonful, and enough gold size to make a paste as thick as putty. Add about twice the volume of turpentine and apply to the parts with a camel's-hair brush.

As the turpentine fumes are detrimental to the sensitive plate, the camera should be left open until these fumes have entirely disappeared.

A Door Fastener

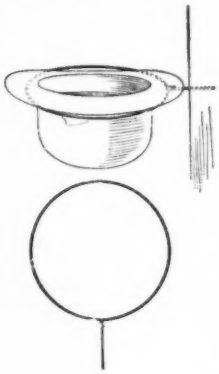
Sometimes it is necessary to fasten a door in a manner to prevent children from opening it, yet so that it is easily opened from either side. This can be done by putting a screw

or curtain hook on the inside of the door frame and using a piece of cord long enough to loop over both hooks. A person coming in or out can remove the loop from either side.—Contributed by John A. Cohalan, Philadelphia, Pa.

¶A floor wax can be made by melting 1 lb. of yellow beeswax in 1/2 pt. of hot, raw linseed oil; then adding 1 pt. of turpentine.

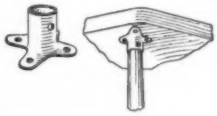
A Hat Hanger

Procure a piece of 1/8-in. wire, about 3 ft. long, bend it into the shape shown in the sketch, and sharpen the projecting end. Drive this into the wall above a coat hanger. This provides a better hat hanger than the ordinary hook.—Contributed by John D. Watt, Roxbury, Mass.

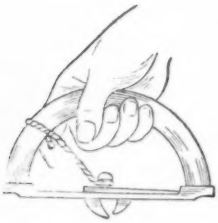


Repairing a Broken Tenon on a Chair Post

Instead of cutting off the four posts to make new tenons where one tenon was broken I used a metal piece made from a short length of bicycle tubing, as shown. The tube was slotted two ways to make four parts which were turned out and flattened. The remaining end of the tube was slipped over the broken post and the four parts were fastened with screws to the under side of the chair seat.—Contributed by Chas. H. Roberts, Calumet, Mich.



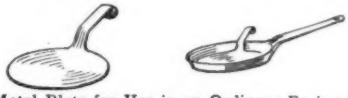
Substitute for an Iron-Holder Knob



The wood knob on the holder for my irons became charred from the heat and finally broke away from the pin. The pin would get so hot in continued use that it could not be moved without burning my fingers. I remedied the difficulty by attaching a short string to the handle and the pin. A pull on the string with the forefinger readily released the iron. I have found this better than the knob, as it is handier to use.—Contributed by Mrs. H. C. Dixon, Johnstown, Pa.

An Egg-Frying Pan

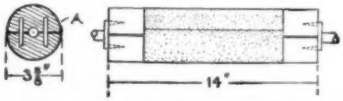
The frying of eggs in an ordinary frying pan is accompanied with some difficulty in removing them when they are cooked without breaking the yolk. Then, sometimes, the pan is too hot and the egg sticks to the pan and the top remains uncooked. A much better way is to shape a piece of sheet metal or tin as shown in the sketch to place the egg in and use it in the ordinary pan. It will not burn the egg, and the egg can be lifted out of the pan and easily slipped on a plate or toast when it is cooked.—Contributed by W. A. Jaquythe, San Diego, Cal.



A Metal Plate for Use in an Ordinary Frying Pan to Cook Eggs without Scorching Them

A Sander Mandrel for the Lathe

A cylindrical sander for use in the lathe can be easily made of two pieces of wood, turned to a diameter that will take the stock size of sandpaper, and clamped together with pinch dogs at the ends. One edge of the sandpaper is clamped between the pieces and then it is wrapped around the wood, the opposite edge being glued to the starting edge, as shown at A. The dimensions given are for a 9 by 12-in. sheet of sandpaper. The sander is easily placed in the lathe centers when needed, and the sandpaper may be replaced at any time.—Contributed by James T. Gaffney, Chicago.



A Wood Mandrel for Attaching Regular Sheets of Sandpaper to Make a Lathe Sander

A Pocket Direct-Current Voltmeter

The assembled drawings of a very simple voltmeter are shown in Fig. 1, and its operation is as follows: The moving portion consists of a pointer, or needle, A; a small permanent magnet, or armature, B, and a counterweight, C, mounted upon a small steel shaft, D. The ends of this steel shaft are pointed and rest in bearings provided in the U-shaped piece of brass E, which is rigidly fastened to the fiber base F, by means of two screws. The permanent magnet B, carried on the shaft D, is at all times under the magnetic influence of the permanent horseshoe magnet, G, which is fastened, by means of thin brass straps, H H, and small screws, to the base F, so that the ends of the armature B are directly above the poles of the horseshoe magnet. The armature B will assume the position shown in the sketch when it is acted upon by the permanent magnet G alone and the moving system is perfectly balanced. A solenoid, J, is mounted in the position shown. When there is a current in its winding its soft-iron core will become magnetized and the magnetic pole produced at the lower end will produce a magnetic force upon the armature B, with the result that the armature will be rotated either in a clockwise or counter-clockwise direction, depending upon its polarity and the polarity of the end of the core adjacent to it. Thus, if the left end of the armature has north polarity, the right end south polarity, and the lower end of the core is magnetized to a south polarity the armature will be rotated clockwise, for the left end, or north pole, will be attracted by the lower end of the iron core, which is a south pole, and the right end will be repelled. This is in accordance with one of the fundamental laws of magnetism which states that magnetic poles of unlike polarity attract each other and those of like polarity repel each other. The amount the armature B is rotated will depend upon the relative effects of the pole of the solenoid and the permanent magnet G. The strength of the pole of the solenoid will depend upon the current in its winding and the number of times the current passes around the core, or the number of turns in the winding. In other words, the strength of the pole of the solenoid

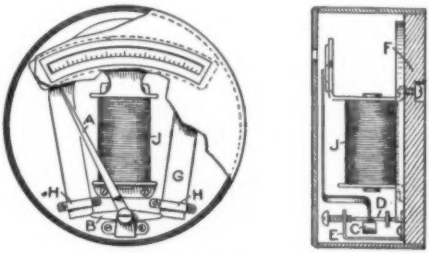


FIG. 1

The Parts as They are Assembled to Make a Pocket Voltmeter for Direct Currents

varies as the product of the current and the number of turns, which is called the ampere-turns. The same magnetic effect can be produced by a large current passing through a few turns or a small current passing through a relatively large number of turns. This simple relation of current and turns gives a means of adjusting the current capacity of the instrument so that a full-scale deflection of the needle will correspond to any desired maximum current. The instrument may be used as either a voltmeter or as an ammeter, and its operation will be identical in each case. The resistance of the voltmeter, however, will be many times the resistance of the ammeter, as it will be connected directly across the line, while the ammeter will always be in series in the circuit in which it is desired to measure the current. The following description and suggestion as to how to proceed in the construction of this instrument may be useful to those who undertake to build one. All the minor details and some of the dimensions will be omitted in the description, but these can be easily supplied.

Procure a piece of hard rubber or fiber, about 1/4 in. in thickness and of sufficient size to cut from it a disk, 2 1/2

in. in diameter. Make a small horseshoe magnet from a piece of the very best steel obtainable, and magnetize it to as high a strength as possible. This magnet is made of a piece of steel, 1/8 in. thick, about 3/8 in. in breadth, and of such length that the overall lengthwise dimension of the completed magnet will be about 1 7/8 in. and the distance between the inside edges of the ends a little greater than 1/2 in. Fasten the completed magnet to the base F by means of two or three straps, made from some thin brass, and small machine or wood screws.

Then cut from some 1/16-in. sheet brass a piece having the general appearance and dimensions shown at A, Fig. 2. Bend the ends of this piece over at right angles to the center portion along the dotted lines. Drill the hole at the upper end and thread it for a 1/16-in. machine screw. By means of a pointed drill, make a small recess at the lower end directly opposite the first hole. This small recess is to form the lower bearing for the shaft supporting the moving system, while a small recess cut centrally in the end of a screw, mounted in the upper hole, will form the upper bearing. The screw placed in the upper hole need be only about 3/16 in. long. The holes in the two wings are for mounting this piece upon the fiber base, as shown in Fig. 1.

The shaft for supporting the moving system is made of a piece of a hatpin. It is about 13/16 in. long and its ends are pointed so that they will turn freely in the bearings provided for them.

The armature is cut from a piece of 1/16-in. sheet steel. It is made about 3/4 in. long, 5/16 in. wide at the center, tapering to 1/8 in. at the ends. A hole is drilled in its center so that it may be forced onto the shaft. It is mounted so that its lower surface comes about 1/4 in. from the lower end of the shaft.

Then cut from some very thin brass a piece, that is to form the needle, 1/4 in. wide at one end and tapered to a point at the other, the total length being about 3 in. Drill a hole in the large end of this piece, the same size as the shaft and 1/2 in. from the end. This piece is not fastened to the shaft until some of the other parts are completed.

The spool upon which the winding is to be placed is made as follows: Procure a piece of very soft wrought iron, 1 1/4 in. long and 1/4 in. in diameter, to form the core. The ends of the spool are made of thin brass and are dimensioned as shown in Fig. 2, at B and C. The piece shown at B is to form the lower end of the spool, and is bent at right angles along the dotted line. The two holes at the lower edge are for attaching the end of the spool to the fiber base. The piece shown at C forms the upper end of the spool and at the same time a back upon which the scale of the instrument is mounted. The holes in the lower edge are threaded for small machine screws, as it will be necessary to fasten this piece to the base by means of screws that pass through the base from the under side, as shown in Fig. 1. Bend the upper and lower portion of the piece over at right angles to the center portion along the dotted lines. Make sure that the large hole in the center of each end piece is of such size that it will fit very tight on the end of the wrought-iron core. Force the end pieces onto the ends of the core a short distance, say, 1/16 in., and hammer down the edges of the core so that the end pieces cannot be easily removed. In fastening the ends to the core be sure that the parts that are to rest upon the base are parallel with each other and extend in opposite directions; also that the ends are at right angles to the core. Then insulate the inner portions of the completed spool with several thicknesses of onion-skin paper, or any good-quality, thin writing paper, and shellac. The winding will be described later.

Mount the spool and support for the bearings upon the base so that they occupy the positions, relative to each other, indicated in Fig. 1. A paper scale is then mounted upon the brass base provided for it by means of some thin shellac. The upper and lower lines for the scale can now be drawn upon

the paper, using the center of the screw at the lower end of the needle as a center. These lines are best placed about 1/8 in. apart and not nearer the edge of the base than 1/4 inches.

The needle is bent over at right angles 5/16 in. from the center of the shaft. Another right-angle bend in the needle is then made so that the pointed end will be about 1/16 in. above the surface of the scale when the large end of the needle is fastened to the shaft 3/8 in. from the upper end of the latter. Turn the needle on the shaft so that the pointer is at the left end of the scale when the moving system is at rest. The shaft must be exactly vertical when this adjustment is made. Cut the end of the needle down until its end is midway between the two scale lines. Solder the needle to the shaft, and then place a sufficient quantity of solder on the broad end to balance the system perfectly and allow it to come to rest in any position when the armature B is not influenced by any magnetic field.

A containing case for the instrument may be made as follows: Make a cylinder from some thin sheet brass, having exactly the same inside diameter as the base, and a height a little greater than the vertical distance from the lower surface of the base to the upper surface of the needle. Also a disk from some thin sheet brass, having a diameter 1/8 in. greater than the outside diameter of the cylinder. Round off the edges of this disk and cut a curved slot in it directly over the scale, about 3/8 in. wide and of the same length and form as the scale. Solder the disk to one end of the cylinder, placing the solder all on the inside. To prevent moisture from entering the case, fasten a piece of thin glass on the under side of the slot in the disk by means of some shellac and several pieces of brass soldered to the disk and bent down onto the glass. The case can now be fastened to the base by means of several screws, passing through its lower end into the edge of the base. Two small binding posts are mounted on the outside of the case, about 90 deg. apart and well insulated from each other and from the case, to serve as terminals for the instrument.

The instrument is now complete with the exception of the winding. Since this is to be a voltmeter and it

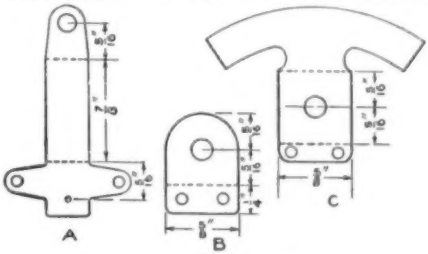


FIG. 2

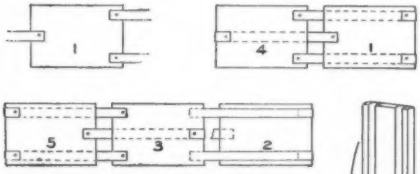
Details of the Supports for the Coil and for the Needle, or Pointer, Shaft

is always desirable that a voltmeter take as small a current as possible, the winding must consist of a relatively large number of turns of small wire, each turn carrying a small current. The difference in the construction of different instruments necessitates that their winding contain a different number of turns in order that a given voltage may produce a full-scale deflection. A little experimenting with different windings is the easiest means of determining the proper size of wire and number of turns to meet individual requirements. After adjusting the winding so that the maximum voltage it is desired to measure produces a full-scale deflection, the scale is calibrated by marking the positions of the needle in accordance with those of the needle of a standard instrument connected in parallel with it. In marking the scale of an ammeter, connect the instruments in series. Remember that if the instrument is to be used as an ammeter, it must have as low a resistance as possible and that to prevent undue heating, the wire must have ample cross section.

If difficulty is experienced due to the continuous vibration of the needle, although the current be practically constant, this trouble can be greatly reduced by mounting a paper wind vane on the moving system, which will tend to dampen its movement.

How to Make Falling Blocks

Procure a thin board large enough to cut six blocks, 2 in. wide and 3 in. long; also 2 yd. of cotton tape, ¼ in.



Set of Blocks Joined with Tape So That They Appear to Fall from the Top

wide, and some very small tacks. Cut the board into pieces of the size mentioned, and number two of them on both surfaces, 1, 2, 3, and 4. Cut off three pieces of tape, 4¾ in. long, and on the side of block 1 tack one piece of tape in the center at one end, and the other two pieces at each edge on the opposite end, all being on one side of the block as shown. Take the other block and lay the side numbered 4 up, then draw the two strips of tape on the edges of block 1 under it and back to the end of the surface on block 4, and tack them on this surface at the edges as shown. The center tape is passed under block 4 and turned over the opposite end and tacked. This is clearly shown in the sketch. Thus the second block will hang from either end of block 1 by simply folding them together and separating the ends.

Mark the sides of the third block 5 and 6, and place it with the two others so that the sides numbered 2, 3, and 5 will be up. Cut off three more pieces of tape, 4¾ in. long, and tack them on as shown, being careful not to tack through any of the first three pieces. Put on the fourth block in the same manner as the third block was attached to the second, and so on, until all the blocks are attached.

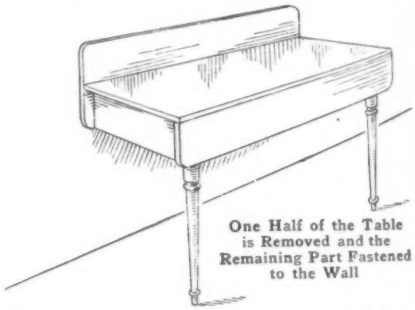
Take hold of the first block on the edges and tip it as shown by the arrow. The second block will then fall as shown by the second arrow, and the third block falls away in the same manner, and so on, down to the end.—Contributed by Wayne Nutting, Minneapolis, Minn.

Writing Name Reversed on Paper Placed on Forehead

The following is an entertaining experiment in a party of young people. One of those present is asked if he can write his name, and will, of course, answer "yes." He is then subjected to the following test: He is asked to sit down in a chair, a paper, folded several times, is placed on his forehead, a lead pencil is handed him and he is asked to write his name on the paper. As little time as possible to reflect should be left him; if he hesitates, he should be told to just go ahead, and in most cases it will be found that he starts writing his name at the left temple and, to the amusement of the others present, writes it in the way of many left-handed persons, that is, so that it is legible only when held in front of a mirror, unless one is practiced in reading reversed writing.

Use for an Old Table

An old table of the extension type, that may have a post broken, can be used against the wall in a kitchen as a work table. If there is a damaged part, that side is removed by sawing the crosspieces of the table in two and attaching it to the wall against the leaf



One Half of the Table is Removed and the Remaining Part Fastened to the Wall

which is turned in a reverse position. —Contributed by A. S. Thomas, Gordon, Can.

Waterproof Shoe Dressing

Melt some tallow and, while it is hot, put in some scraps of rubber from old rubber shoes or boots. Be careful to select rubber that is free from cloth. Put in as much of the rubber as the tallow will absorb. Stir freely while it is melting, and keep it away from any flames. Allow it to cool and set away for future use. Take enough for immediate use and warm it sufficiently so that it may be applied with a brush.—Contributed by F. S. Cummings, Detroit, Mich.

An Adjustable Bench Stop

A simple adjustable bench stop for light work may be made from a piece of 1-in. broom handle and a piece of piano wire. Plane a flat surface on the broom stick and drill two $\frac{1}{16}$-in. holes, about $\frac{1}{4}$ in. deep, $\frac{1}{4}$ in. from each end. Bend the ends of the wire to enter the holes and have the wire of such length as to give it a slight curve between

The Spring Wire will Hold the Stop at Any Desired Position for Height

the ends when it is in place on the stick.

Bore a 1-in. hole through the bench top where it is desired to use the stop and cut several grooves, as shown, in the walls of the hole with a compass saw. The spring wire will slide into a groove and hold the stick wherever it is set. The position of the face can be changed by inserting the stick so that the wire will enter the right groove.—Contributed by Alan H. Andrews, Fall River, Mass.

A Crochet Hook

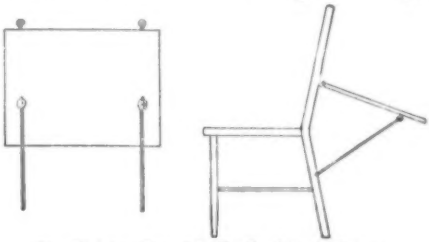
In making some kinds of lace work different-sized hooks must be used as the work proceeds. Considerable time will be lost in changing from one hook to another, if they are separate. The best way is to mount all the hooks necessary on one handle, as shown in the sketch. The handle part is made of a large wire or small rod, bent to the

A Crochet-Hook Handle for Holding Several Hooks That are Required for Some Lace Work

shape shown and with holes drilled through the ends for a small rivet. The ends of the hooks are drilled or bent to fit on the rivet. A small tin ferrule is made to slip over the handle and the hooks not in use. All hooks but the one in use are turned back into the handle and the ferrule slipped into place.—Contributed by Miss Nita S. Ingle, W. Toledo, O.

Writing Board for Children

A writing desk for a child can be easily made as shown in the sketch. The materials necessary are a board of suitable size, two screwhooks, four screweyes and a pair of rods for braces. The hooks are screwed into the back of a chair and the screweyes into the board, as shown. This desk is instantly attached or taken down when desired. If the chair is light and apt

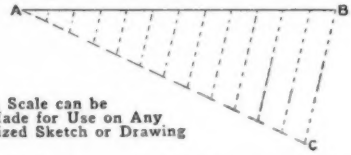


The Writing Board is Easily Attached to, or Detached from, an Ordinary Chair Back

to tip over, make the rods long enough to reach to the floor.—Contributed by John V. Loeffler, Evansville, Ind.

Geometric Principle in Line Division

When sketching a plan, if any one of the first few lines drawn is found to be the proper length, then this line can be



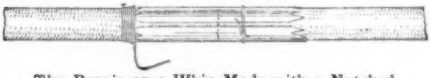
A Scale can be Made for Use on Any Sized Sketch or Drawing

made into a scale by the geometric rule for dividing a given line into equal parts.

Suppose, for example, the line AB, which is to represent 12 ft., is found to be 1 ft. long. Draw a line, AC, at any angle from the point A and step off on it 12 equal parts, beginning at A. The last point, or the one at C, is connected to the end B, then eleven other lines are drawn parallel with CB. Thus AB will make a scale of 1 in. to each 1 ft.—Contributed by James M. Kane, Doylestown, Pa.

Repairing a Broken Whip

Procure a piece of thin tin—the metal taken from a discarded fruit can will do—and cut it about 2½ in. long and wide enough to encircle the break. Notch the ends like saw teeth and remove any sharp edges with a file. Place the tin on the break and tie temporarily. Wind the whole from end to end with a waxed linen thread, such as used by harness makers. The threads lying alternately on the whip and on metal at the notched ends eliminate any possibility of the parts working loose. A break near the small and flexible end of a whip is repaired in the same manner, using a quill instead



The Repair on a Whip Made with a Notched Ferrule and a Waxed Thread

of the tin. In either case, do not let the edges of the splicing material meet, and it will clamp tightly on the whip. —Contributed by W. S. Kingsley, W. Gouldsboro, Me.

Repairing a Worn Thimble

Silver thimbles are easily worn through at the end, and they can be quickly repaired by soldering from the inside. A very neat repair can be made with an alcohol lamp and a blowpipe by using a little silver solder. Borax or resin is used as a flux.

A Small Torch

A small torch, that will give a very fine and hot smokeless flame, can be made from a piece of glass tube, about 4 in. long, and 4 ft. of rubber tubing. The glass tube is heated in the center

A Torch Made of Glass and Rubber Tubing, to be Used on an Ordinary Gas Jet

until it is red, then the ends drawn apart so that the tube will have a small diameter. After the glass has cooled, make a small scratch with a file on the thin part and break it. One of the pointed ends is connected to a straight piece of glass tube with a short piece of the rubber tube, as shown in the sketch. A small hole is cut in the side of the piece of rubber to admit air to the gas. The torch is connected to an ordinary gas jet.—Contributed by E. K. Marshall, Oak Park, Ill.

Fountain Attachment for an Ordinary Pen

A quite efficient fountain pen may be quickly made by bending an ordinary

The Space between the Pens Forms the Fountain, Which is Sufficient for Considerable Writing

pen, as shown at A, and inserting it in the holder opposite to the regular pen, as shown at B. For best results, the point of the auxiliary pen should just touch the regular pen.—Contributed by Thos. L. Parker, Wibaux, Mont.

¶A little water added to oil paint will make a flat or lusterless finish and will do no harm to the paint, as the water evaporates in time.

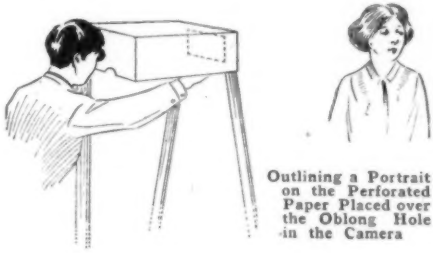
To Make Whitewash Stick to Surfaces Coated

In using whitewash much difficulty is experienced in making it stick to the substance covered. A good way to prevent the coating from cracking and peeling off is to add 2 oz. of pure sodium chloride to every 1 gal. of whitewash mixture. This is not expensive, but should be secured at a drug store because some salts of sodium are not pure and will darken the whitewash. The sodium chloride should be added after the whitewash solution is made up. When this mixture is used in buildings it will destroy all vermin which it touches.

A Mechanical Camera

The young person who likes to draw will find the device illustrated of great assistance for outlining a portrait or a bit of scenery which can be filled in to make the picture. The camera consists of a box without a cover, about 12 in. long, 6 in. wide and 4 in. deep. An oblong hole is cut in one end, a small hole bored in the other, and a piece cut out of the lower edge so that one eye can be placed close to the hole. The oblong hole, shown by the dotted lines, is covered with a fine perforated cardboard, the kind used for working in mottoes with yarn. Supports are nailed in the corners of the box, their length being calculated to allow the operator to sit or stand, as desired.

The camera is used in the manner illustrated. If a portrait is to be drawn, then the one sitting for it must be quiet until the outlines are completed. The operator, looking through the hole, traces the lines on the cardboard between the perforations. When the outlines are drawn in this manner, the cardboard is removed and placed on the paper or cardboard used for the picture. The outline is then transferred by marking with a sharp-pointed



Outlining a Portrait on the Perforated Paper Placed over the Oblong Hole in the Camera

pencil through the perforations on the outlines as drawn. After separating the two pieces, the markings can be connected with a continuous line and an exact outline will be obtained which can be filled in as desired. The outline picture is a sample of work done with the camera.—Contributed by Florence Thomas, Gordon, Ont.

Gauge Attachment for a Pocket Rule

The base of the gauge A is cut from a block of hard wood, about 2½ in. long, 1 in. wide and ⅜ in. thick. A notch is cut in one side to admit the rule and the wedge B, which has a slot that slides on a pin in the base. A small metal clip keeps the wedge in place. The gauge can be readily set on the rule at any mark.

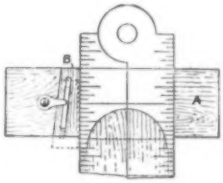


Plate Hangers

In hanging old china plates for decorative purposes use three large white dress hooks, placed at equal distances apart on the edge of the plate. The hanging wire or cord is run through them from the back side and drawn up tightly. These hooks are much better than the ordinary plate hanger, as they are small and will not show much on the plate.

INTERESTING NEW PATENTS

Fig. 1

COMBINATION TEA-COFFEE-COCOA POT FOR LUNCH ROOMS (Fig. 1; British patent to an American)—To save time in quick-lunch rooms is evidently the purpose of this compartment coffee pot. The tank inside is divided into three separate pots for tea, coffee, and cocoa, or any other combination. Each compartment communicates with the main spout through an opening which is closed by a flap valve operated by a trigger over the handle of the pot.

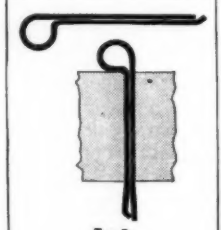


Fig. 3

PENCIL HOLDER FOR THE EAR (Fig. 2)—A little device has been invented to enable a clerk to keep his pen or pencil behind his ear, even if his hair is too short to hold it. A tiny flexible band which fits around the ear has a short prong which stands up close to the head and furnishes a holder to grip the pencil.

SELF-LOCKING COTTER PIN (Fig. 3; British patent to an American)—This split pin, which might be used as a cotter pin, is arranged so that the ends automatically bend out and secure the pin as it is driven into place. The legs of the pin are of unequal length and the longer one is bent over the end of the shorter. The eye of the pin is also offset, so that when the pin is in place a blow with a hammer causes the shorter leg to pass the bent end of the longer leg, spreading the end of the pin and locking it in place.

Fig. 5

NURSING-BOTTLE HOLDER (Fig. 4)—A baby can drink from this nursing bottle, but cannot drop it. The patented framework is made of wire and is pivoted to the chair rest at the end toward the chair so that the baby can tip the head of the bottle downward to drink from it and the holder will take it back to a horizontal position as soon as the baby lets go of it.

FLASHLIGHT CLUB FOR POLICEMEN (Fig. 5)—An electric flashlight is built into the handle of this policeman's billy with the bull's-eye on the end of the handle to enable an officer to use his hands to the best advantage. The control button is on the side of the handle so that the policeman can flash the light from the back of his hand and keep the club ready for its usual work.

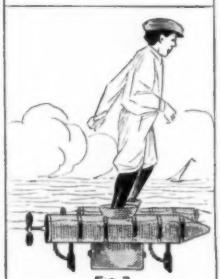


Fig. 7

FOLDING DUCK DECOY (Fig. 6)—This duck decoy will fold flat so that it can be easily carried or stored away. It is made of two pieces of tin, cut and painted to look like the two sides of a duck, and fastened together along the top edges. A rectangular piece of board forms the bottom and the float, and the lower edges of the tin side pieces are bent over to hold the board in place after they have been sprung apart.

SHOES FOR WALKING ON WATER (Fig. 7; German patent)—With one of these floats on each foot, a man is supposed to be able to walk upon water. Each float is built of a series of hoops connected by hinged rods so that the entire frame is collapsible. A ballast tank beneath the foot keeps the float right side up and affords stability. The floats are driven by screw propellers which get their power from a number of flaps protruding from the bottoms of the floats.

INDOOR GOLF (Fig. 8; British patent)—This device transforms a carpet into a golf putting green. Instead of driving the ball into a hole, the player perfects his aim by trying to putt the ball through a small arch. When the ball goes through the arch it rings a bell.

Fig. 9

APRON TO COVER TYPEWRITER KEYBOARD (Fig. 9)—When student stenographers are learning the "touch" system of operating a typewriter, they often have difficulty in keeping their eyes off the keyboard. This apron is arranged to hang from the neck to the front of the machine so as to cover the keyboard and hands.

LIGHTED DINNER BUCKET (Fig. 10)—It is an ordinary dinner pail with a bull's-eye lamp to light its owner on his way home. The oil lamp stands in a little compartment at the bottom of one end and a reflector throws the light through a lens in the end of the pail. Above it is a coffee can to be kept warm by the lamp.

Fig. 2

Fig. 4

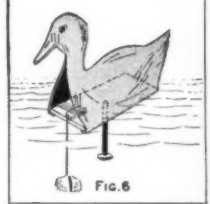
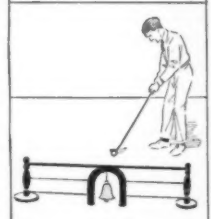


Fig. 6



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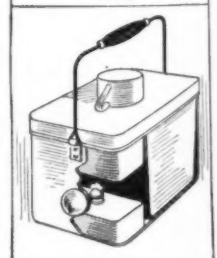

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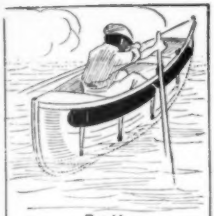


Fig. 11

Fig. 13

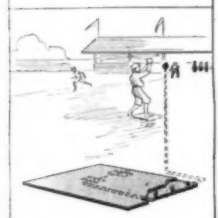


Fig. 15

Fig. 17

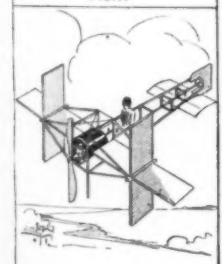


Fig. 19

ADJUSTABLE PONTOONS FOR SMALL BOATS (Fig. 11; British patent to an Australian)—These pontoons, intended to make a small boat nonsinkable and noncapsizable, can be adjusted according to the load and the height of the gunwale above the water. They are fastened to the boat's side by means of cords passing over pulleys below the water line and cleats on the gunwale, so that the pontoons can be raised or lowered until they rest upon the water.

COMPARTMENT HATBOX (Fig. 12)—By an ingenious arrangement of cardboard partitions, this hatbox is arranged to hold a large number of straw or flat felt hats in a very small space. The hats are arranged so that the brim of one hat laps over the crown of the next without touching it.

DETACHABLE SHIRT SLEEVES (Fig. 13)—When a man wears one of these shirts he does not have to roll up his sleeves to keep them clean—he can take them off. The lower half of each sleeve, from the elbow down, is made separately so that it can be taken off and replaced quickly.

COMPARTMENT DINNER PAIL (Fig. 14)—This dinner bucket is made up of five separate compartments which keep various kinds of food separate and can be used as dishes. Each compartment is flat and circular and has eyelets on each side to slide over the two uprights that make the frame of the pail.

AN AUTOMATIC UMPIRE (Fig. 15)—This signal base for baseball diamonds makes the sharp eye of the umpire unnecessary. When the runner touches the base, a bell rings and the umpire's decision is easily made. The base is made of two boards hinged together and kept slightly apart by a spring. A slight pressure of the foot brings the boards together, makes an electric contact, and rings a gong placed where every one can hear it.

COMB FOR APPLYING HAIR TONIC (Fig. 16)—Working on the principle of a fountain pen, this comb spreads scalp tonic, hair oil, dye, peroxide, or any other preparation, as it is drawn through the hair. The top of the comb is hollowed out to form a reservoir and each tooth is a hollow tube. A small trough which runs along under the main reservoir supplies the hollow teeth with liquid received from the reservoir through valves controlled by a push button. A little pressure on the button on top of the comb allows a small quantity of liquid to run into the trough, ready to flow out through the hollow teeth as the comb is drawn through the hair.

LIGHTED TAXICAB SIGNS (Fig. 17; British patent)—Every taxicab displays on its taximeter a little metal flag which announces whether the cab is vacant or occupied, but it is sometimes hard to see the tiny flags at night. This device does away with the difficulty. Two little electric signs, one reading "Vacant" and the other "Occupied," are placed on the edge of the roof of the cab and connected with the taximeter so that one or the other of them is illuminated according to the position of the flag.

ADJUSTABLE COLLAR BANDS FOR SHIRTS (Fig. 18)—Men whose necks are too large or too small for standard shirts have difficulty with their collars, which is easily overcome by this adjustable collar band. A number of buttonhole tags are sewed in a row on each end of the collar band and it is not hard to find the proper combination to fit any collar.

FLYING MACHINE WITH REVOLVING WINGS (Fig. 19)—The frame of this new flying machine is very much like that of a monoplane and it has horizontal and vertical rudders at the rear end of the frame and a motor-driven propeller in front. But its two wings are each made up of two or more planes or vanes intersecting along the line of a shaft parallel with the direction of flight. These multiple-vane wings are arranged so that they can be freely revolved on their shafts.

COMBINED HAIRBRUSH AND COMB (Fig. 20)—This hairbrush has a clip for holding a comb pivoted on its back. A spiral pin on the clip pivot holds the comb tightly against the back of the brush or in a vertical position ready for use. The comb can be used separately.

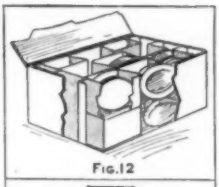
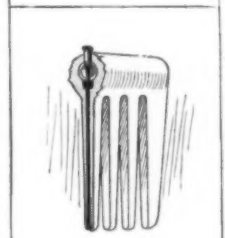


Fig. 12

Fig. 14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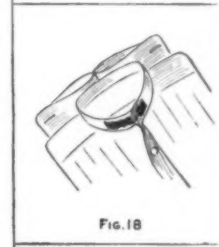
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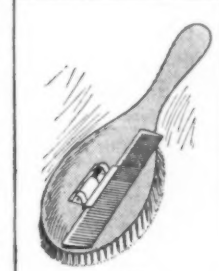


Fig. 20

THE teacher of a Sunday-school class tried to impress upon her young charges the necessity of prayer before meals.

"Billy," she asked a little fellow whose father was an elder in the church, "what does your father say before you eat your dinner?"

"I dun know."

"Well, what did he say this morning before breakfast?"

Billy meditated; suddenly he remembered and beamed.

"He said: 'You kids go slow on the butter now! It's 40 cents a pound.' "—School Board Journal.

◆ ◆ ◆

"My wife and myself are trying to get up a list of club magazines. By taking three you get a discount."

"How are you making out?"

"Well, we can get one that I don't want and one that she doesn't want and one that neither wants for $2.25."—Washington Herald.

◆ ◆ ◆

Long—They say that Dame Fortune knocks once at every man's door.

Short—It was her daughter, Misfortune, who called upon me.—Boston Transcript.

◆ ◆ ◆

"What is an anecdote, Johnny?" asked the teacher.

"A short, funny tale," answered the little fellow.

"Quite right," said the teacher. "And now, Johnny, you may write on the blackboard a sentence containing the word."

Johnny hesitated a moment, and then wrote: "A rabbit has four legs and one anecdote."—Youths' Companion.

◆ ◆ ◆

"So you don't guide hunting parties any more?"

"Nope," said the guide. "Got tired of being mistook fer a deer."

"How do you earn a living now?"

"Guide fishin' parties. So fer, nobody ain't mistook me fer a fish."—Public Ledger.

◆ ◆ ◆

"Yes, there are miracles, even in these days," he said, laying his paper aside.

"What has happened?" asked his wife.

"Neither an English nor a German aviator seems to have been killed yesterday, and I can't find anything in the paper about a French torpedo boat being sunk with its entire crew."—Record-Herald.

◆ ◆ ◆

Paying Teller—I cannot cash this check, madam.

She—Why not?

Paying Teller—There isn't enough money here to meet it.

She—Then can't you meet it halfway?—Marine Journal.

◆ ◆ ◆

"Pop, what is the difference between an artist and an artisan?"

"An artisan, my son, can usually make at least three dollars a day."—Judge.

◆ ◆ ◆

"What are you smiling about?" asked Noah.

"I was just thinking," replied Japhet, "how lucky it was we could go ahead and build this ark without waiting for an appropriation from Congress."—Western Druggist.

The man is brave who rides upon the wind,
But braver still the maid he leaves behind.

—London Motor

One day a college youth went West and got work on a farm. He wasn't very well informed about farm life, but, as he was willing to work, the farmer hired him. That night the farmer said, "How are you—a pretty good runner, boy?"

The collegian swelled with pride. "I took the prize at college for being the fastest runner."

"Well, then," said the farmer, "you can bring in the sheep."

Two hours later the young man entered exhausted, his breath coming in short gasps.

"Have any trouble?" asked the farmer, grinning to himself.

"I got the sheep in easy enough," said the youth, "but I had an awful time catching the lambs."

"Why, I haven't any lambs," said the farmer, in surprise.

Together they walked to the pen. There were all the sheep—and also five jack rabbits.—Pathfinder.

◆ ◆ ◆

"They gave poor Bill three years just for sneezing."

"For sneezing? How d'ye make that out?"

"Well, he was cracking a safe and he sneezed and woke the watchman."—Boston Herald.

◆ ◆ ◆

Baker—Puffer doesn't believe in hiding his light under a bushel.

Hamilton—I should say he doesn't! He puts it in front of a reflector.—Newark News.

◆ ◆ ◆

"Did you have a bad toothache?"

"I think so, but if you know of any other kind of a toothache, perhaps it was that kind I had."—Pittsburgh Dispatch.

◆ ◆ ◆

Smith—Have you taken in the auto show?

Jones—Sure! I never miss 'em.

Smith—You don't own a car. Why are you so interested?

Jones—Well, once a year I like to look at a bunch of 'em I don't have to dodge.—Philadelphia Inquirer.

◆ ◆ ◆

Uncle Ned—Why, Johnnie, you don't swear, do you?

Johnnie—No, I don't swear, but I know all the words.—Harvester World.

◆ ◆ ◆

One Kid—I ain't heard none of them giant crackers you was bragging about.

Other Kid—Aw, get up to date, kid! I shot 'em all off, but I put Maxim silencers on 'em.—Chicago Ledger.

◆ ◆ ◆

"I see that one of our young baseball phenoms is to be sent back to the minors for more seasoning."

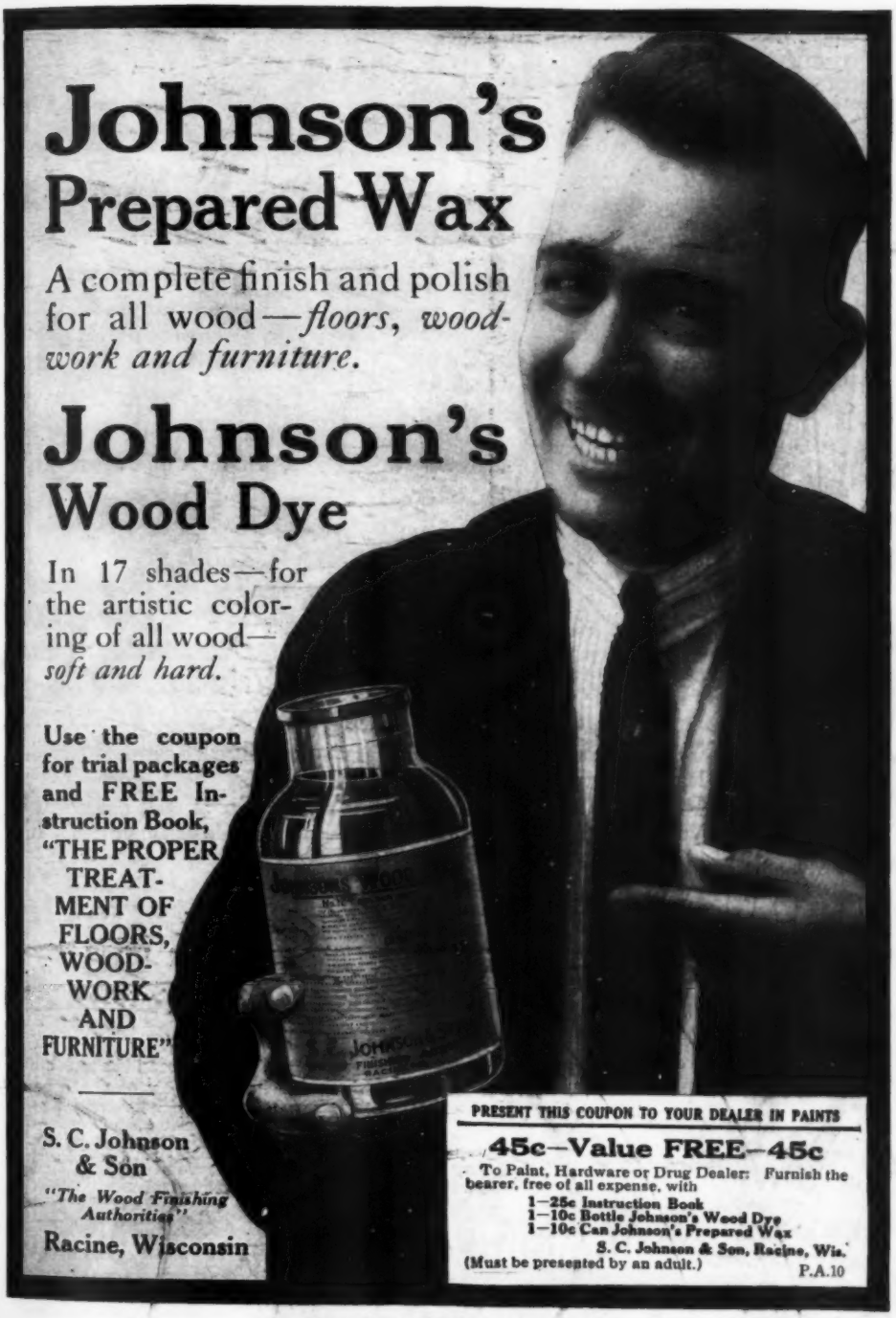
"Yes, evidently he lacks pepper."

"But maybe it's another way of saying that he isn't worth his salt."—Detroit Free Press.

◆ ◆ ◆

He was subject to fainting spells, and before starting out he wrote this note, which he pinned to his shirt:

"To the Doctor. If I fall on the street and am taken to the hospital do not operate. My appendix has been removed twice already."—Ladies' Home Journal.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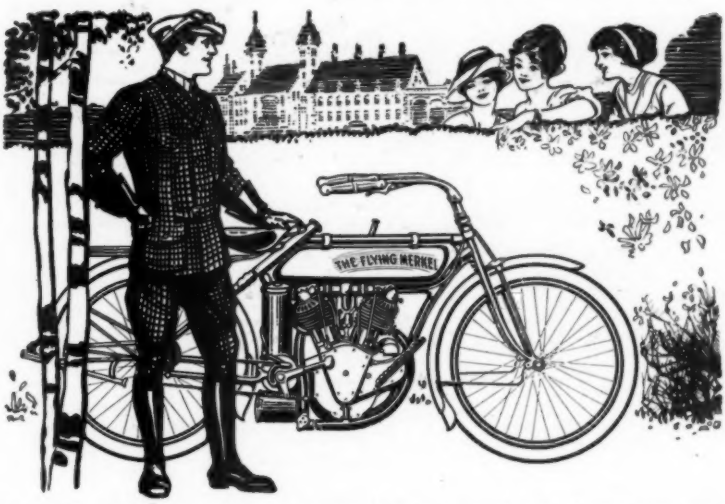

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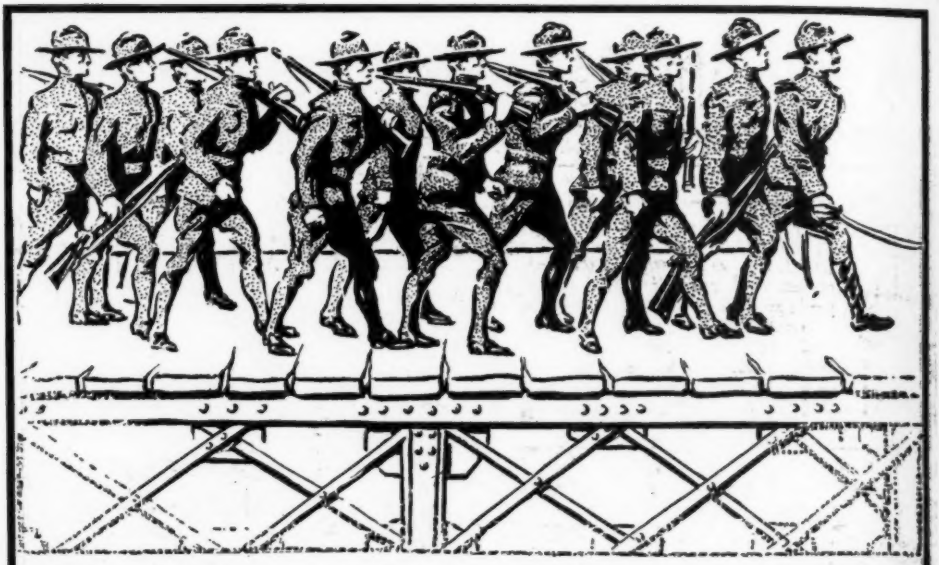

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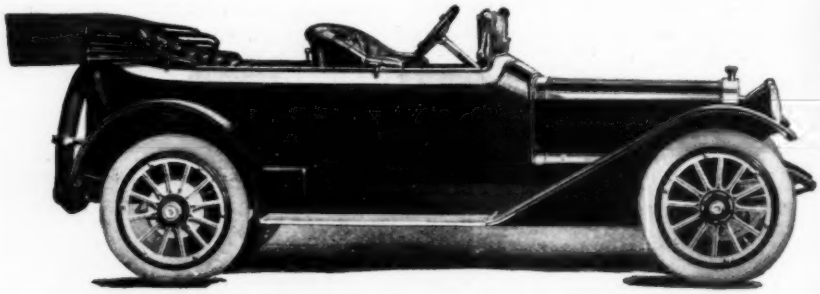

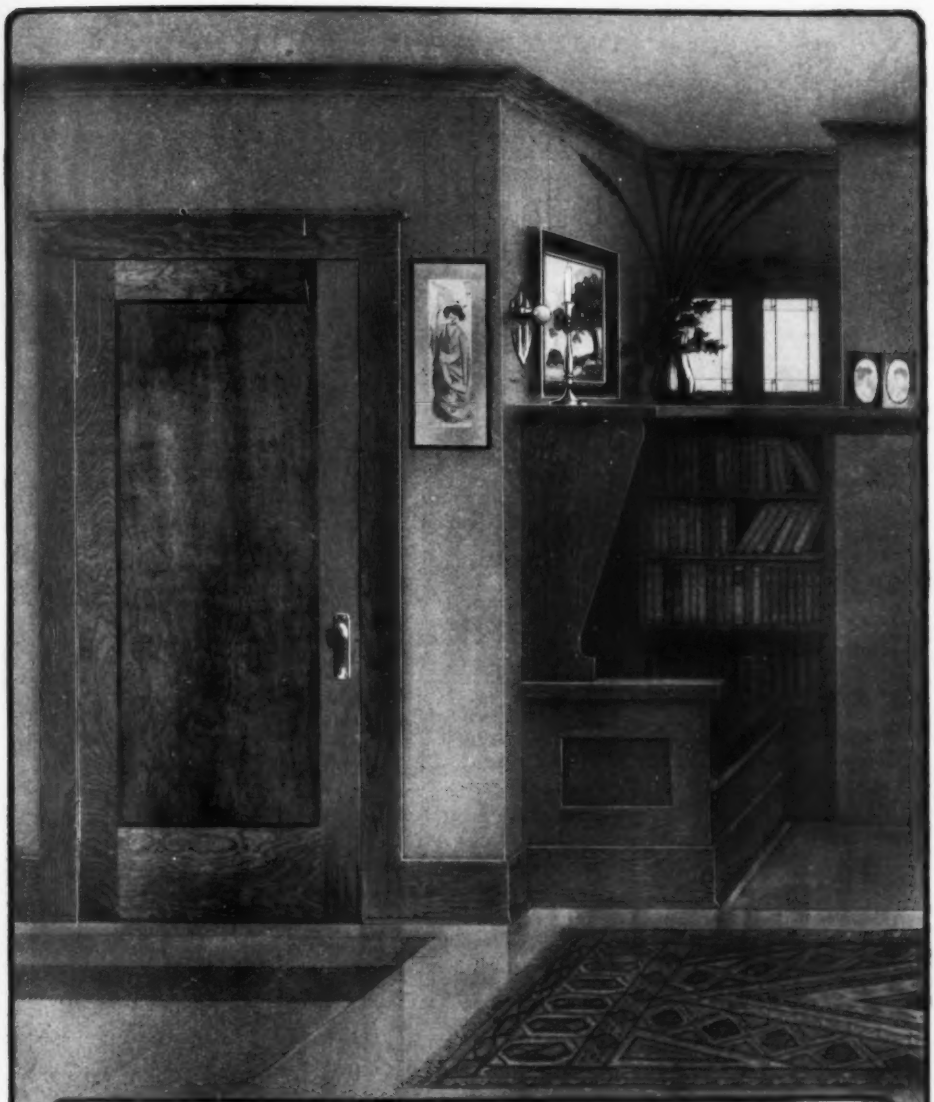

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2. The demand always exceeds the supply, and I tell you how and where to market them.
3. I have started more people in this business and made more successful growers than any man in the world.
4. I have seen people start at home with little beds in basements, barns, sheds, etc., and increase their planting until they got to a point where they devoted their entire time to the mushroom business.
5. Beginners with my instructions often have better crops than old experienced growers. If you can read English, you can by my method grow mushrooms successfully.

Women succeed in mushroom business as well as men. Mrs. Mary Bonar, Ohio, writes: "I know a woman can raise mushrooms successfully, for I have tried it and succeeded." Mrs. Guillaumne, Wis., says: "Can sell all I have at 80 cents per pound." Boys find a "sure enough" gold mine in mushrooms. Herbert Fickenworth, 12 years old, Chicago, writes: "I am picking and selling mushrooms every day." Webster Jones, aged 14 years, Little Rock, Ark., says: "Any boy who is willing to follow directions can learn to grow mushrooms. Growing mushrooms is just the kind of work a boy likes, and I know I can make more money out of it than anything else."

MUSHROOMS MAKE MONEY

Just read these extracts from letters such as I am receiving every day:

1. "From my first bed of 50 square feet, I raised 80 pounds of mushrooms which I sold at 70c a pound." It cost $2.00 to spawn this bed and this customer sold $56.00 worth of mushrooms, leaving a profit of $54.00 on an investment of $2.00.
2. "From the last $20 worth of spawn I bought of you I sold $300 worth of mushrooms."
3. A customer who started in 1910 writes me in 1913: "I have never failed yet to grow mushrooms by your method and with your spawn."
4. One of the oldest and largest growers in England writes as follows: "I have read everything that I could find on mushroom growing and I congratulate you most heartily on having produced the best book, in my opinion, on the subject, ever published."
5. Every State Agricultural School in the United States has my book of instructions as a reference book. One of the biggest crops that I ever heard of was grown at one of the Experimental Stations by my method of growing and with my spawn.
6. Two of my customers in Arlington Heights, Ill., last year invested $75 in the mushroom business and raised $680 worth of mushrooms in the basements of their homes, leaving a clear profit of $605 on an investment of $75.

I Will Tell You the Facts About This Business

I spent 20 years in the mushroom business. I owned and operated for years the largest plant in America, and I am now associated with the biggest Mushroom Company in the world. We have spent up to date $100,000.00 building and equipping our plant for growing mushrooms.

I know how to grow them and I can show you how to make larger profits on smaller investments, growing mushrooms, than anything else you can take up.

I have put the facts about this business into a beautifully illustrated booklet, entitled "Money in Mushrooms," telling you when, where and how to start, the kind of spawn (or seed) to plant, etc. Information worth many dollars to you, sent absolutely free.

Put your name and address on coupon and mail to:

A. V. JACKSON
FALMOUTH MUSHROOM CELLARS, Inc.
26 Gifford St. FALMOUTH, MASS.

TEAR OFF THIS COUPON AND MAIL TODAY

A. V. Jackson
Falmouth Mushroom Cellars, Inc.
26 Gifford St.
Falmouth, Mass.

Please mail me your book "How to Make Money in Mushrooms," and also give me full information as to the best way to start, cost, etc. All this to be entirely without cost or obligation on my part.

Name .....

Address .....

Town .....

State .....

Fairy Magic—Telephone Reality

A tent large enough to shelter his vast army, yet so small that he could fold it in his hand, was the gift demanded by a certain sultan of India of his son, the prince who married the fairy Pari-Banou.

It was not difficult for the fairy to produce the tent. When it was stretched out, the sultan's army conveniently encamped under it and, as the army grew, the tent extended of its own accord.

A reality more wonderful than Prince Ahmed's magic tent is the Bell Telephone. It occupies but a few square inches of space on your desk or table, and yet extends over the entire country.

When you grasp it in your hand, it is as easily possible to talk a hundred or a thousand miles away as to the nearest town or city.

In the Bell System, 7,500,000 telephones are connected and work together to take care of the telephone needs of the people of this country.

As these needs grow, and as the number of telephone users increases, the system must inevitably expand. For the Bell System must always provide a service adequate to the demands of the people.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy *One System* *Universal Service*

Please Mention Popular Mechanics

The Watch That We Don't Want to Sell

A Genuine Illinois

With 17 Jewels—a 20-Year Gold-Filled Case

Priced for This Offer at $13.75

We say to you frankly that this watch at this price is something we have no desire to sell.

If you want it and buy it, we will buy it back from you in 30 days if you think that you don't want to keep it.

If you want any other watch—and we carry hundreds—we would rather sell it to you than to sell you this.

And we never again shall sell this watch at this price—or any watch equal to it—when this offer ends.

But we want an account with you. We sell thousands of things in Jewelry, etc., and we want you to know this house. So we have bought ten thousand of these watches. We bought them from the Illinois Watch Co., one of the greatest American watch makers.

They are the 17-jeweled movements—exactly the same as are sold all over the country in the highest-class jewelry stores.

We are going to sell these watches at $13.75—with a 20-year gold-filled case—just to open up ten thousand new accounts. You are welcome to one of them if you order before this stock is gone.

Send $1 Only

Send with your order only $1. We will trust you for the rest. Then send $1 monthly until the bill is paid. That gives you a year and over.

Wear the watch 30 days. Then, if you wish to, send the watch back, and we will return your $1. There will be hundreds waiting at that time to get this Illinois watch at this price.

Offer Ends Oct. 15

This offer ends **Oct. 15.** Or it ends before that if the 10,000 watches are taken. After that, all these special orders will need to be returned. We will send out then our regular jewelry catalog and ask men to order from that.

But you can get this watch for $13.75, and for $1 down, if you send us the order at once.

Then, as long as you live, you'll remember this offer as the best one ever made to you on a famous, high-grade watch. If you want this watch please send us this coupon. And to save disappointment kindly send it today.

Spiegel, May, Stern Co

3565 **Wall Street, Chicago**

Our Price $13.75

Only $1 Down
A Whole Year to Pay

This watch has a **17-jeweled movement**—it is a perfect timekeeper. The price seems impossible. But we guarantee this watch to have 17 fine jewels, and to be a genuine Illinois watch, exactly the same as sold in jewelry stores.

The case is a **20-Year Gold Filled Case.** That is, it is warranted for 20 years. It is open-face and a beauty. The back is handsomely engraved. It has a screw back and bezel, so it is positively dust-proof.

The watch is **guaranteed for 25 years.** We send with the watch this guarantee certificate. Think of that—only $13.75 for almost a lifetime of perfect watch service.

The watch is a **perfect timekeeper.** No better timekeepers were ever made than the 17-jeweled Illinois. Every man who knows watches knows this.

If you want to sell this watch back to us, after 30 days' use, we will return every cent that you pay on it.

SPIEGEL, MAY, STERN CO.,
3565 Wall Street, Chicago

I enclose first payment of $1.00, for which send, express paid, the 17-jewel Illinois Watch No. X1277, described by your advertisement. If I keep it I will pay $1.00 each month until $13.75 has been paid. If I return it within the 30-day trial period you are to send me back my $1.00.

Name.....

Postoffice.....

St. or Box No.....State.....

Jewelry Catalog Free—It contains everything that is new in watches, diamonds and jewelry—all sold on our easy credit plan. Just drop us a postal and it will be mailed you free. But don't fail to use the coupon and send us $1.00, as this wonderful watch offer will never be made again.

Typewriter Sensation

2 DOLLARS A MONTH

Buys a genuine Standard No. 2 SMITH-PREMIER Typewriter and at $71.20 less than the manufacturer's price.

Never before has anything like this been attempted. Dealers get $3.00 a month rent for this make of machine not nearly as perfect as the one we will send you, and you pay only **Two Dollars a Month and Own It.**

Send the Coupon and We Will Ship You This Smith-Premier Typewriter on Approval

When the typewriter arrives, deposit with the express agent $8.80 and take the typewriter three days and try it. If you find it the best typewriter you ever saw, satisfactory in every respect, keep it and send us $2.00 each month, until our special price of $28.80 is paid. If you don't want to keep it, return it to the express agent, and he will give you back your $8.80, and return the typewriter to us. We will pay the return express charges. You won't want to send this machine back after you have seen it and tried it. You can't imagine the perfection of these machines till you see one, and the price is **$71.20 less than the catalogue price**, and it is guaranteed just as if you paid $100.00.

COUPON

HARRY A. SMITH, Dept. P,
No. 180 North Dearborn Street, Chicago, Ill.

Ship me a No. 2 Smith-Premier f.o.b. Chicago, as described in this advertisement. I will pay you the $20.00 balance of the **special** $28.80 purchase price, at the rate of $2.00 per month. The title to remain in you until fully paid for. It is understood that I have three days in which to exnmine and try the typewriter. If I choose not to keep it I will carefully repack it and return it to the express agent. It is understood that you give the standard guarantee for one year.

Name.....

Address.....

Shipping Point.....

Perfect machines only, complete outfit, nothing extra to buy, no strings of any kind to this offer. Just think of buying such a typewriter for $8.80 down and $2.00 a month. Thousands of people have paid $100.00 cash for Smith-Premiers. **It's standard,** by many considered the best typewriter ever built. A key for each character, so each character is always the same; a type brush for cleaning the type built into the machine; the tilting carriage with one slight motion of the hand instantly throws all the previous writing in plain sight of the operator without disturbing the writing position in any way; comes to you with tools, rubber cover, everything ready. It runs beautifully. It's wonderfully simple and strong. It will last a lifetime. I sold a similar supply of these beautiful machines about a year ago to everybody's satisfaction.

Act today to be sure

This offer is limited, so tear off the Coupon—mail it today—the typewriter will be shipped to you promptly without any formalities. You can't lose and it's the **greatest** economical typewriter opportunity you will ever have. The coupon states the terms. Fill it out; send it now, today.

LET US GIVE YOU THIS TRANSPARENT CELLULOID TRIANGLE

It is 4 inch size, 30°+60° angles. Lowest retail price, 25 cents. Absolutely essential to everyone who draws. We make this offer to introduce our new catalogue showing

SPAULDING'S NEW CARRYING CASES AND COMPLETE OUTFITS

for **designers, architects, engineers** and **students**—compact, durable and convenient. Spaulding's Carrying Cases are made light and strong. They provide well arranged compartments, including **space for drawing board and T square.** Handled like a suit case; unique, practical, inexpensive. Outfits include all necessary equipment. If you draw, send us five 2-cent stamps to-day to pay postage and get the free triangle and the catalogue.

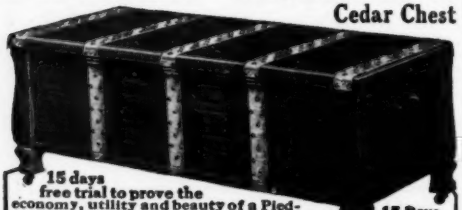
SPAULDING PRINT PAPER CO.
44 Federal St. BOSTON

WHY LIGHTNING APPEARS TO GO ZIGZAG—When lightning flashes came to be photographed, a few years ago, the previously accepted idea of their zigzag form was found to be untrue. According to Dr. Otto Meissner, a German scientist, the zigzag effect is due to an imperfection of our eye. When the eye sees a flash it instinctively jumps a little, causing the image of the flash on the retina to be broken. This movement occupies only a very small fraction of a second and thus we do not realize it, but it is enough to make the flash appear to our mind as being zigzag in form instead of continuous.

Over 80,000 in Use
Mostly sold by recommendation, **For Personal Desk or General Office.**
It checks mental calculations.
Handsome Morocco case free.
Buy Thru Your Stationer.
Write for 10 day trial offer.
E. Gaecher, A. A. M. Co.,
119 W. Broadway, New York City.

Agents Wanted

For Xmas—Moth-Proof Cedar Chest



15 days free trial to prove the economy, utility and beauty of a Piedmont Southern Red Cedar Chest. Saves furs, woolens and plumes from moths, mice, dust and damp. Ideal Xmas, birthday or wedding gift. Low factory prices. Freight prepaid.

15 Days Free Use in Your Home

Book FREE Write for beautifully illustrated 64-page catalog, showing all charming designs, sizes and amazing prices of Piedmont Chests. Also book, "Story of Red Cedar." Postpaid, free. Write today.
PIEDMONT RED CEDAR CHEST COMPANY, Dept. 385, Statesville, N. C.

The Best Business Card

for your use and for any man's use who desires the distinction of attention to little things is the Peerless Patent Book Form Card. It will get close and careful scrutiny, and that means an audience with most favorable attitude of mind from your prospect.

Peerless Patent Book Form Cards not only save fifty per cent of your cards, but they are always together and get-at-able when you want to hand one out. They are always clean, perfectly flat, and every edge is smooth and perfect. Send for a sample and detach the cards one by one and see for yourself.

OUR SMART CARDS IN CASE

Send today.

THE JOHN B. WIGGINS COMPANY
Sole Manufacturers
Engravers, Die Embossers, Plate Printers
62-64 East Adams Street CHICAGO

The Rise of A Man Who *Wouldn't* Stay Down

Hard work and low pay are for the man who *thinks* he "hasn't a chance." But the ambitious man trains himself for a better job—*and gets it.*

Only a few years ago the man whose rise we picture here was working 12 hours a day for 7 days a week. But he made up his mind to train himself for something better. He marked and mailed just such a coupon as you see below. He studied at home. His earnings increased. He was made Foreman. And now he is Chief Engineer.

Now Chief Engineer

This man had no advantages that *you* don't have. His education was poor. His spare time was limited. And he lived a thousand miles from Scranton. But with the help of the I.C.S. he has "made good." YOU can do the same in the line of work you like best. If you can read and write and really *want* to make something of yourself, the I.C.S. can help you.

Made Foreman

Mark and mail the attached coupon. It won't obligate you in the least — and the I.C.S. will show you how you too can rise to a high-salaried position through their simple and easy system of home instruction.

Mark and Mail the Coupon NOW

Studies at Home

Marks the Coupon

Take the First Step Toward a Good Job TODAY

INTERNATIONAL CORRESPONDENCE SCHOOLS

Box 872-X, Scranton, Pa.

Please explain, without further obligation on my part, how I can qualify for the position before which I have marked X.

Electrical Engineering	Mechanical Engineer
Electric Lighting	Mechanical Draftsman
Electric Railways	Shop Foreman
Electrician	Concrete Construction
Electric Car Running	Architect
Dynamo Foreman	Contracting and Build'g
Wireman	Architectural Draftsman
Mining Engineer	General Illustrating
Telephone Expert	Chemist
Surveyor	Bookkeeper
Automobile Running	Advertising Man
Agriculture	Civil Service Exams.
Poultry Raising	Salesmanship

*Name*_____

*St. and No.*_____

City _____ *State*_____

*Present Occupation*_____

Get Holstein Cows' Milk For Your Baby

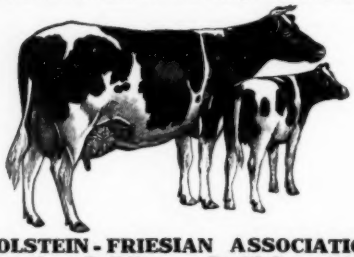
Perhaps you cannot nurse your baby. Then take the precaution to use clean, fresh Holstein milk, the nearest substitute for breast milk. Then you will have every right to expect your baby to make rapid progress and establish a strong constitution.

In Holstein milk, as in human milk, the cream or fat is divided into minute particles or globules less than half the size of those in ordinary milk. So when Holstein milk reaches the stomach it acts just as human milk does. The curds formed are small, soft, flaky and easy to digest. In common milk on the contrary, the curds formed are large and heavy and show a tendency to stick together in a solid mass.

Holstein cows have long been famous for their size, health and strength so it is not surprising that their milk proves to be the most wholesome.

Holstein milk costs no more than common milk. If your milk man cannot supply you, send us his name and we will help you secure some.

Write for our free Booklet "The Story of Holstein Milk."



HOLSTEIN - FRIESIAN ASSOCIATION
1-F American Building Brattleboro, Vermont

"JUNK" THAT OLD STOVE

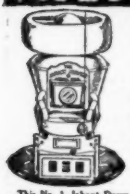
IT HAS EARNED A REST

An IMPERIAL, with its **stone oven-bottom**, ash sifter, odor-hood and oven thermometer, saves Dealers' profits, cuts your fuel bills one-third and your work one-half. **Test it 30 days at our risk.** Lasts a life-time. Credit if you want it. You ought to know all you can learn about ranges before you buy any range. Our stove and range book tells you. It's free.

Write for it NOW

THE IMPERIAL STEEL RANGE CO.
269 Detroit Ave. Cleveland, O.

BUY YOUR FURNACE $10 DOWN $10 A MONTH



This No. 1 Jahant Down-Draft Furnace (weight over 1000 lbs.) as it stands $48.00 cash, delivered east of Omaha and north of Ohio River.

Our monthly payment plan of selling direct saves you the dealer's profits and charges for installation. The

Jahant Furnace

with the patented "Down Draft System" is best for residences, schools, hotels, churches, etc., because it delivers plenty of heat wherever and whenever desired at a saving of 1-3 to 1-2 in fuel bills. Install the Jahant yourself. We send complete outfit, freight prepaid with special plans, detailed instructions and all necessary tools for installation. Satisfaction guaranteed or money refunded.

Write for free illustrated book.

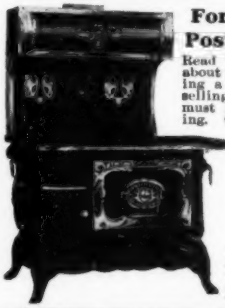
THE JAHANT HEATING CO.
168 Mill Street Akron, Ohio

Save ⅓ to ½ on Fuel Bills

Suppose We Give You $25

—That's practically what we do. $5 or $25 or $30 or $40—different sums depending on which Kalamazoo stove you buy. You keep the dealer's profit. You get your stove direct from the Kalamazoo factory. It's shipped the day your order comes. You try it for 30 days *free*—and if you keep it you can still send it back any time within a year if you're dissatisfied with its work. We pay freight charges.

Book of 400 Stoves



For a Postal

Read facts about making and selling stoves that you must know before buying. Our *easy terms* explained. Bank guarantee. Letters from a few of the 250,000 owners.

Ask for Catalog 473

KALAMAZOO STOVE CO.
Manufacturers
Kalamazoo, Mich.

We make a full line of Stoves, Ranges, Gas Stoves and Furnaces. We have three catalogs. Please ask for the one you want.

"A Kalamazoo Direct to You"

Trade Mark Registered

And Gas Stoves Too

SUN SPOTS—There is some excitement in Europe over the fact that the spots in the sun have disappeared. The economists have yet to be heard from. At first sight there may not seem to be much, if any, connection, between astronomy and finance, except that certain financiers seem to have been born under a lucky star; but, as a matter of fact, sun spots, in the opinion of a number of famous economists, play a great part in the prosperity

DON'T PAY TWO PRICES

Save $8.00 to $22.00 on Hoosier Ranges and Heaters

Why not buy the Best when you can buy them at such low, unheard-of Factory prices. Our new improvements absolutely surpass anything ever produced. Save enough on a single stove to buy your winter's fuel. Thirty days' free trial in your own home before you buy.

Send postal today for large free catalog and prices.

HOOSIER STOVE CO.
249 State St. Marion, Ind.

Giddap!

THE AMERICAN SELF-HEATING FLAT IRON

demands the instant attention of all agents who like to ride in the main band wagon. Life is too short to fiddle around with worthless articles. This iron has no competition when it comes to construction, appearance, general satisfaction and selling qualities. One hundred per cent profit and cash rebates. Exclusive territory and full protection guaranteed. Swell sample cases. Shall we reserve a seat in our band wagon for you? Write quick.

American Gas Machine Co., 301 Clark Street ALBERT LEA, MINN.

You Burn a Light,
DON'T YOU?
YOU PAY FOR IT TOO
DON'T YOU?
If You Positively Knew You Could Have a
Much Better Light
That Was Thoroughly Reliable, Safe, and Durable and would
Save 75% of Your Light-Bills
AND
GET TEN TIMES YOUR PRESENT LIGHT
You Would Buy It, WOULDN'T YOU?

The International Lamps Will Do It!
We Guarantee It!

No Ugly Wires or Rubber Tubes to Hold Them.
Can Be Carried Anywhere

300 to 800 CANDLEPOWER
Send for Catalog and Prices Today.
The Best Agency Proposition in America.
Exclusive, Protected Territory to Wide-Awake Men.

BIG PROFITS QUICK SELLERS
Needed In Every Home, Store, Shop.
Write at once. Get our "Help Sales" Plan. Make a business man's income.

This Is Your Opportunity
Get Your Territory

INTERNATIONAL LIGHT, NOVELTY & SPECIALTY CO., 311 River St., Dept. 55, Chicago

of countries. For one thing, the magnetic storms, which are said to be occasioned by them, sometimes play hob with the crops, and that's where they get into the books on political economy. For another—well, there are all sorts of theories about sun spots and most of them have yet to be proved correct. But there's something on which all the authorities seem to agree; which is, that the earth is very much better off when there are not any spots on the sun than when there are.

ANY PERSON CAN MAKE **$25.00 to $60.00** weekly all or spare time with wonderful **WHITE FLAME BURNER.** Sells like wild fire. 6 to 8 in every home. **USERS DELIGHTED.** Six stamps or coin gets complete sample and particulars. Satisfaction or money back. Exclusive Territory.
WHITE FLAME LIGHT CO., 206 Clark Bldg., Grand Rapids, Mich.

KEYLESS PADLOCK
No knobs to turn—no clicks to count. Press the buttons and it flies open—40,000 combinations possible. Operated as easily in dark as in light. Solid brass. **AGENTS making 100% profit.** Sells on sight —no competition. Write today for terms of free sample. A postal card will do. Address
AMERICAN KEYLESS LOCK CO., 653 W. Jackson Blvd., CHICAGO

The "BEST" LIGHT
300 CANDLE POWER
A handsome portable lamp that gives a brilliant, economical light. Makes and burns its own gas. Makes you independent of gas or electric lighting companies. Over 200 styles of lamps, ranging from 100 to 2,000 candlepower.
AGENTS MAKE BIG MONEY.
Write quick for catalog.
The Best Light Co.
324 E. 5th St., Canton, O.

Salt Mackerel, Codfish Fresh Lobster

FOR YOUR OWN TABLE

FAMILIES who are fond of **FISH** can be supplied **DIRECT** from **GLOUCESTER, MASS.,** by the **FRANK E. DAVIS FISH COMPANY,** with newly caught **KEEPABLE OCEAN FISH,** choicer than any inland dealer could possibly furnish.

We sell **ONLY TO THE CONSUMER DIRECT,** sending by **EXPRESS RIGHT TO YOUR HOME.** We **PREPAY** east of Kansas on orders above $3.00. Our fish are pure, appetizing and economical and we want **YOU** to try some, payment subject to your approval.

SALT MACKEREL, the fat, meaty, juicy fish are delicious for breakfast. They are freshly packed in brine and will not spoil on your hands.

CODFISH as we salt it, is white and boneless and ready for instant use. It makes a substantial meal, a fine change from meat at much lower cost.

FRESH LOBSTER is the best thing known for salads. Right fresh from the water, they are simply boiled and packed in **PARCHMENT LINED CANS.** They come to you as the purest and safest lobster you can buy and the meat is as crisp and natural as if you took it from the shell yourself.

FRIED CLAMS are a relishable, hearty dish that your whole family will enjoy. No other flavor is just like clams, whether fried or in a chowder.

FRESH MACKEREL, perfect for a fried fish, **SHRIMP** to cream on toast, **CRABMEAT** for Newburg and devilled, **SALMON** ready to serve, **SARDINES** of all kinds, **TUNNY** for salad. **SANDWICH FILLINGS** and every good thing packed here or abroad, you can get here and keep right on your pantry shelf for regular or emergency use.

With every order we send **BOOK OF RECIPES** for preparing all of our fish products.

Our list tells how each kind of fish is put up, with the delivered price, so you can choose just what you will enjoy most. Send the coupon for it now.

FRANK E. DAVIS FISH CO.
29 Central Wharf, GLOUCESTER, MASS.
Please send me latest Fish Price List
Name..... St..... City..... State.....

BUY PLUMBING and HEATING SUPPLIES at WHOLESALE Will Save You 30%

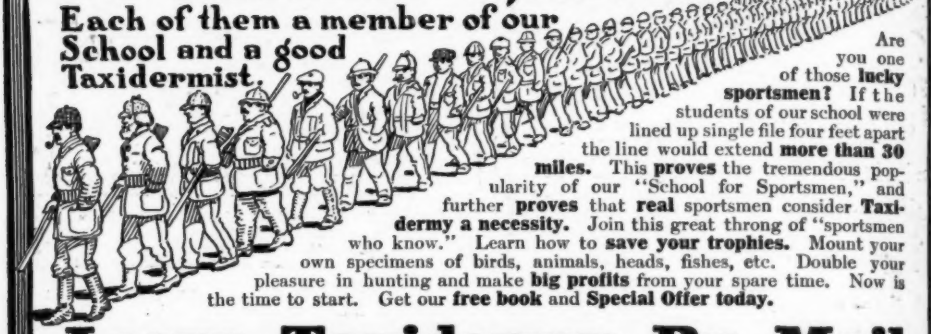
Don't pay retail prices. Full stock on hand for prompt shipment. *Send for free catalog.*
B. P. KAROL, 768 to 772 W. Harrison St., CHICAGO

TRIUMPH STAND LAMP
A 300 Candle Power Lamp for Home, Store, Shop, work bench, library, desk, or wherever a stand lamp can be used. Can be turned up and down like gas, and carried around with more safety than a kerosene lamp, and gives 10 times the light at less than ¼ the cost to operate. We have 6 distinct lines of gasoline hollow wire systems and lamps, SMALL lamps for SMALL rooms and LARGE lamps for LARGE rooms in most attractive styles at less than ½ the cost of gas or electricity. Our POP Catalog tells all about them. Get it now and decide which line you want.

BRILLIANT GAS LAMP CO.
Dept. 1, 1009 S. Wabash Ave., CHICAGO, ILL.

30 Miles of Sportsmen

Each of them a member of our School and a good Taxidermist.



Are you one of those **lucky sportsmen?** If the students of our school were lined up single file four feet apart the line would extend **more than 30 miles.** This **proves** the tremendous popularity of our "School for Sportsmen," and further **proves** that **real** sportsmen consider **Taxidermy a necessity.** Join this great throng of "sportsmen who know." Learn how to **save your trophies.** Mount your own specimens of birds, animals, heads, fishes, etc. Double your pleasure in hunting and make **big profits** from your spare time. Now is the time to start. Get our **free book** and **Special Offer today.**

Learn Taxidermy By Mail

Complete course of 40 lessons. Teaches **all** branches of taxidermy. Learn to stuff and mount your valuable trophies of **birds, animals** and **fishes;** also to **tan** hides and make rugs and robes. Delightful work, easily learned **at home,** by men, women or boys. Decorate your home, den or office with nature's choicest throphies. You positively **double** your **interest** in hunting and fishing. **Big profits in Taxidermy,** $20 to $50 per week from your spare time of $2,000 to $5,000 a year if you go into the business. You are loosing half the pleasure of hunting if you throw your specimens away. **Get in line** with the **best sportsmen** and **learn taxidermy.**

Taxidermy Book Free Beautiful illustrated 48 page book and copy of the "Taxidermy Magazine" sent **absolutely free.** Write for them **today.** Don't miss this opportunity. **Investigate!** If you are a sportsman you can't **afford** to delay a moment for delay means loss to **you.** Let us explain what taxidermy is and how we teach it by mail. Send for our **free books** now.

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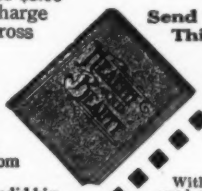

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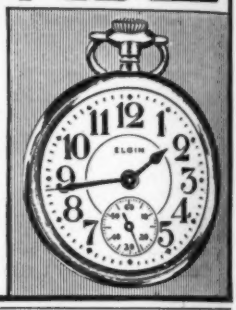

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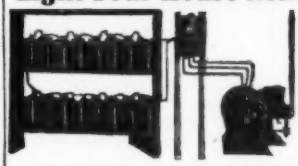

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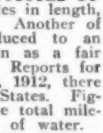

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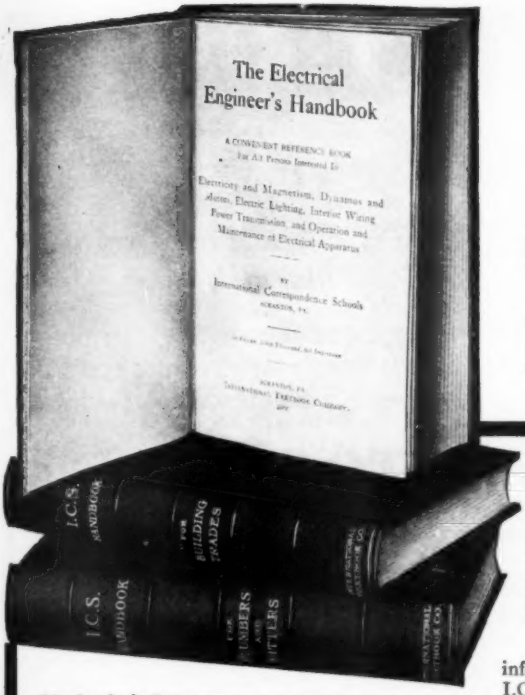

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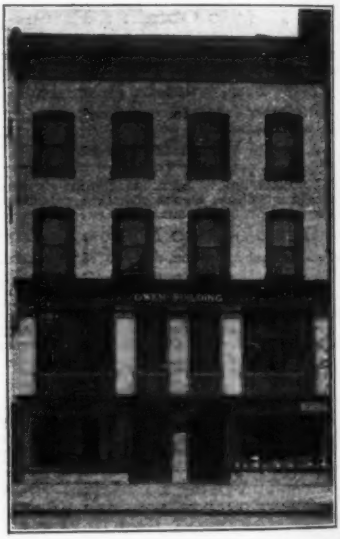

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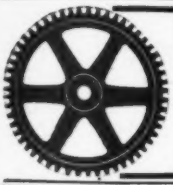

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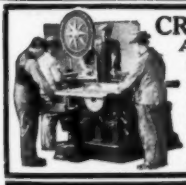

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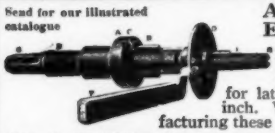

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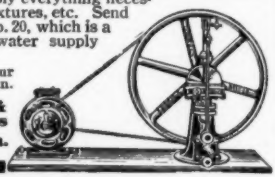

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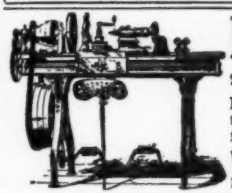

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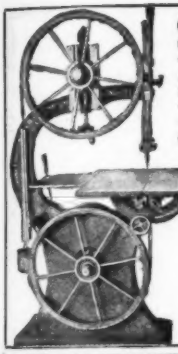

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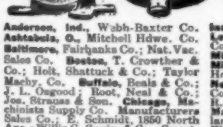

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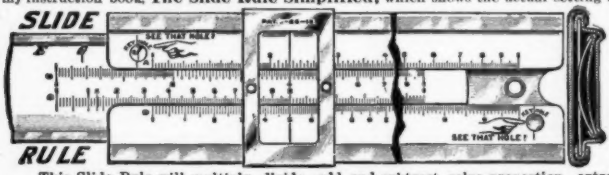

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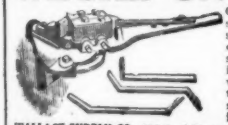

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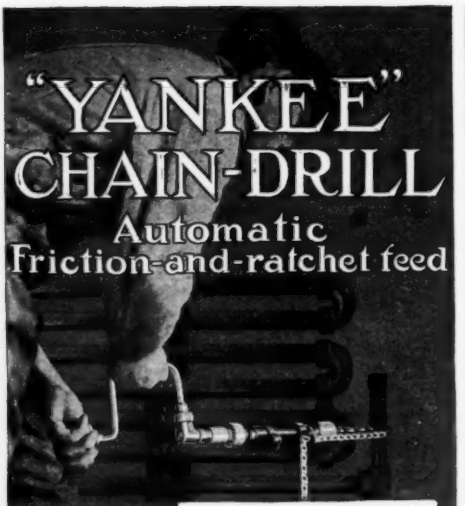

THE "YANKEE" Chain Drill is the only chain drill with Automatic Friction and Ratchet Feed.

The "YANKEE" won't break your drills. The *automatic ratchet feed* keeps an even, steady pressure on the cutting point all through the job. The "YANKEE" is quickly and easily adjusted,—by a few turns of the brace, the *automatic friction feed* tightens the chain and starts the drill with least effort.

Just one movement of a little lever from upright to horizontal accomplishes this change from the friction to the ratchet feed. No complicated parts to handle, nothing to do but turn the brace and change the lever position.

"YANKEE" Chain Drill No. 1500

Automatic friction-and-ratchet feed

Ingeniously constructed and as carefully made as every "YANKEE" Tool. Three-jaw chuck. Jaws of tool steel. Holds round shank drills to ½ inch diameter. Square-thread, steel feed screw insures durability. Made also with two-jaw chuck.

"YANKEE" Chain Drill 9¾ in. long, 3¼ lbs. weight.

No. 1500—Price $3.00

Your dealer can supply you

Write for "'Yankee Tool' Book"—free—showing styles of Yankee Ratchet, Breast, Hand Drills and other "Yankee" Tools.

NORTH BROS. MFG. CO., Philadelphia

"YANKEE" TOOLS

Make Better Mechanics

WHEN YOU BUY

LUFKIN

Measuring Tapes and Rules

YOU ARE SURE OF

ACCURACY—DURABILITY—EFFICIENT SERVICE

Send for catalogue and sample piece of steel tape with *Instantaneous* Readings.

THE LUFKIN RULE CO.

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WITH THE

PERFECT AUTOMATIC SHEAR HONE

You can sharpen your own shears better than you have ever hired them sharpened.

The Shear Blade is **automatically** held by a Clamping and Pressure Spring at just the right pressure on the Hone, and at the same time is guided to the proper Oblique Bevel to give the Cutting Edge the Right Grain. It will last a Life Time; is 6"x2¼"; weighs 14 oz.

Sent prepaid on receipt of $2.00

Trial proves satisfaction or your money refunded.

THE CHEMUNG MFG. CO., Elmira, N.Y.

collected from the middle of the car.)

"Irikuchi wa busso de gozaimasu." (The entrance is full of danger.)

"Tadaima suriga-nori-mashita." (A pickpocket has just come on board.)

Gold production in the Philippines increased from $189,953 in 1911 to $570,212 in 1912, and is expected to be three or four times that amount this year.

Everyone Interested in Mechanics

Increase your efficiency by using the

So-Easy Center Finder

A handy little tool for laying out work. Can be used for centering and drawing radial lines on round, square, or hexagon stock; also for laying out keyways, etc. Sent anywhere by return mail on receipt of **25 cents.**

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Myers' Wonderful Sewing Awl

sews leather, canvas, shoes—anything, heavy or light. Complete repair shop in itself. Saves many trips to town. Mends harness, saddles, wagon covers, blankets, buggy tops, belts, etc. Can't get out of order. Original and only awl with diamond point full grooved needle to protect the thread. BIG MONEY FOR AGENTS.

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FOR TOOL MAKERS AND MACHINISTS

Twelve styles, felt lined drawers, solid brass trimmings, best of material, beautiful finish, low prices, satisfaction guaranteed. Ask for booklet of cases built for service.

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OF THE

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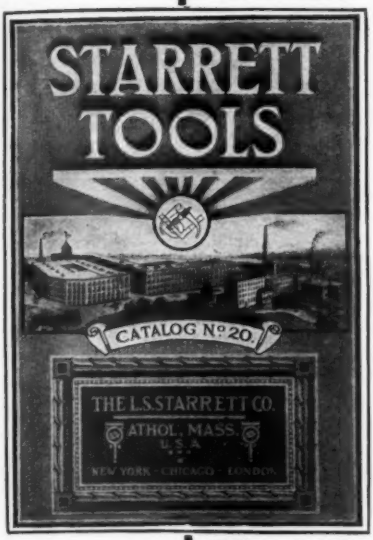

Sit down and fill in the coupon and let us send you our latest 320-page catalog No. 20. It gives information, prices, and illustrations of all kinds of mechanics' tools. It contains also tables and information of value to the machinist and engineer. The Starrett catalog, as you know, has the most complete list of mechanics' tools there is.

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WORLD'S GREATEST TOOLMAKERS
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CUTS TIME AND FUEL BILL 50%
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EMMELMANN BROS. MFG. CO. INDIANAPOLIS IND. U.S.A.

STOP THAT LEAK

Solderene TRADE MARK

and a Candle are all you need to make a permanent repair.

Full directions with each stick. It requires no skill. Anybody can use it. Price, Ten Cents.

SOLDERENE MFG. COMPANY, 90 Portland St., BOSTON, MASS.

A Mile of Cutting Surface Per Minute

Marvel Foot-Power Grinder

Equal to highest priced power machines. Has 8-inch Corundum cutting wheel which does not affect temper of finest edge; ball bearings; self lubricating. Any boy can operate. Cheap, durable; easily carried—only 8 pounds. Fastens rigidly by thumb screws to any bench, table, etc. Sent ready to use, **ONLY $4.00.** Money back in 10 days if not satisfied.

Descriptive Folder **FREE**

BISON GRINDER MFG. CO.
410 Morgan Bldg. **BUFFALO, N. Y.**

Side-line men and agents write for proposition

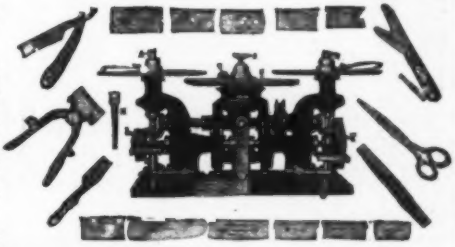
"AMERICAN" Key Cutter

A Steady Income—Independence—for You!

$5.00 to $10.00 a day with little effort and small investment. Others are doing it—so can you.

Why not establish yourself in this immensely profitable business? We show you how and supply everything—everything but a little enterprise; that's up to you! Our two unique machines do the trick. The **"American"** is the only machine that sharpens, hones, and strops razors, and all kinds razor blades, scissors, clippers, pocket knives, surgical instruments, etc. No previous experience necessary. The **"American"** Key Cutter is a little wonder, cuts any shape slot. Booklet of information furnished FREE.

State Agents wanted



AMERICAN SHARPENING MACHINE CO., Inc.
Dept. 10, 184 W. Washington St. **CHICAGO**

Pocket Knife
No. K0153
Price $1.75

Edges That Cut Clean

The high quality of Keen Kutter steel produces blade edges that cut clean—cut easily—cut quickly.

Keen Kutter pocket-knife blades are firmly pinned and the handles do not loosen or crack.

KEEN KUTTER

Pocket Knives—Razors

Keen Kutter safety-razor blades are made of the finest Swedish cutlery steel. The Keen Kutter Regular Safety Razor and Keen Kutter Junior Safety are set at the correct cutting angle, which enables the most inexperienced man, to start shaving right away without practice. At $1.00 the Keen Kutter is a wonderful value.

Every Keen Kutter article is not only guaranteed, but your dealer will refund its cost if it is in any way unsatisfactory.

Keen Kutter Junior Safety Razor No. KJ10 In neat traveling case Price $1.00

"The Recollection of Quality Remains Long After the Price is Forgotten."
—E. C. SIMMONS.

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If not at your dealer's, write us.

SIMMONS HARDWARE COMPANY, Inc.

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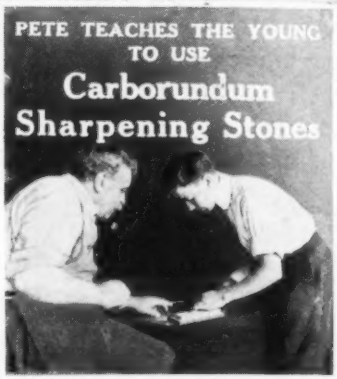
Pocket Knife No. K3551
Price $0.85



PETE'S first advice to the budding carpenter or the student craftsman is:

"Learn to take the proper care of your tools, so, first of all, get a good oil stone. Get a stone that will cut the edge on the tool, not one that rubs it on. A stone that will cut quick, holds its shape, and not glaze."

The experienced workman, too, should heed Pete's advice. He means a Carborundum Sharpening Stone. Ask your hardware man to show you the rectangular or the round combination Carborundum Bench Stone.—They are the greatest stones for all around work you could ever put in your kit. For your gouges, get Carborundum gouge stones.

From your hardware dealer or order direct

The Carborundum Company
Niagara Falls, N. Y.

"Ohio" Edge Tools

are made from specially selected tool steel, by careful and skillful workmen. They are tempered by the most improved process and are sold with a money back guarantee.

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Insist on "Ohio" Tools when buying **Planes, Chisels, Drawing Knives, Auger Bits, Screw Drivers, etc.**

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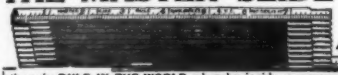
Grobet Swiss Files

and other high-class Tools are shown in "THE TOOL-MONGER" — it's 465 pages, and will be mailed on receipt of 8 cents in stamps.

MONTGOMERY & CO., 107 Fulton Street NEW YORK CITY

THE MASTER SLIDE RULE,



the only **RULE IN THE WORLD** whereby inside measurements of doors and windows, etc., can be taken rapidly and accurately. Also superior to any other rule for outside measurements of walls and ceilings, etc., as it can be extended and closed instantly. **MECHANICS, BUILDERS, AND ARCHITECTS, TRY ONE TODAY! DON'T WAIT.** Ask hardware dealer for it.

On receipt of 15 cents per lineal foot, a 4, 5, 6 or 8 foot rule will be sent to you prepaid. Large profits to agents. Write for circulars and particulars.

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Exports from the United States to Canada have practically doubled in the last three years according to the official figures of the Bureau of Foreign and Domestic Commerce.

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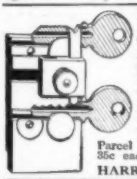
The United States supplied, according to Canadian figures, 63 per cent of the imports of Canada in 1912, against 58.4 per cent in 1902.



Duplicate Keys for all Pin Tumbler Locks can be made in a minute with

The Harrison M. I. P. Key Filing Machine

Invaluable for Machinists, Building Superintendents, Hardware and Repair Shops, Locksmiths, Carpenters, Electricians, Garages, etc. Anyone can make a perfect duplicate key without injuring the original. A customer writes: — "We made 65 keys in one hour and 16 minutes. Can you beat it?" Every machine unconditionally guaranteed, money refunded if not entirely satisfactory. Price $3.00 net. Send us P. O. order or N. Y. draft and receive the complete machine by return Parcel Post. Special diamond shaped files for angular keys 35c each or 4 for $1.00. Testimonials sent on application.

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GET EVERLASTING RESULTS

by the ALLEN-FLUX route

No longer the word **soder** to identify us, it's because the goods have **spoken for themselves.**

For hard-to-get-at places, big joints for electric-light wiring, switch-boards, annunciators, etc., use **Allen Soldering Paste.** Saves a great deal of joint scraping. Acts equally well on very fine work or heavy connections. Never fails to **hold the joints.** We want you to test severely **Allen** Soldering Paste. If your dealer hasn't it — electrical or hardware — send his name and 15c for can; 25c for collapsible tube with attachable aluminum nozzle.

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You need one of the many styles shown in our free catalogue. They are the best built and most practical on the market and it's the up-to-date way to keep tools in good condition and orderly arranged. We ship direct to you and guarantee complete satisfaction.

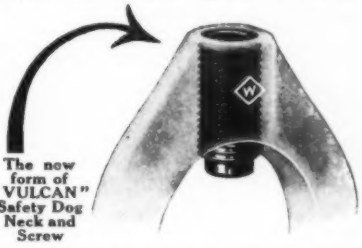
H. Gerstner & Sons.

Mfrs. of Mechanics' High Grade Tool Cases

818 Germantown Street. DAYTON, OHIO

100% Safety

That is what you want!



The new form of "VULCAN" Safety Dog Neck and Screw

"VULCAN"

Safety Lathe Dogs

will give it to you

¶ The logical application of safety lies in the use of tools which are fool-proof—which lack attachments that you can forget to use.

¶ **"Vulcan"** Safety Lathe Dogs provide for the simplest and only non-encumbered means, assuring safety automatically.

¶ Until recently your employer was without the means to furnish real safety dogs but the **"Vulcan"** tools have made another story of it.

¶ Help yourselves and you will help your employer. Suggest 100% **"Vulcan"** Safety.

Send for dependable tools catalogue

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Superior Drop-forgings

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The common form of old style dog neck and vicious screw

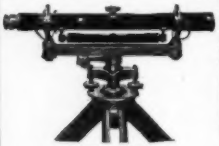
Rent This Transit or Level for Nine Months

THEN IT'S YOURS

Engineers and Surveyors

Here is the most wonderful offer that has ever been made in high grade instruments. High prices and cash payments are eliminated. For the first time it is possible for every surveyor and engineer to own his own Transit or Level, and to secure it on terms so easy that it is much cheaper to buy your own instrument in this way than to rent one even occasionally.

THE TRANSIT is fully equipped with 9-inch achromatic telescope, three spirit levels, vertical circle, horizontal limb, leveling screws, canvas, vernier, etc.



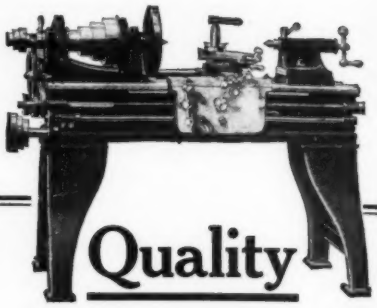
THE LEVEL has 18-inch telescope, erecting eye piece, rack and pinion movement, 8-inch spirit level.

50 Years of Quality

For more than fifty years Aloe's surveying instruments have been recognized as a reliable product. Engineers and surveyors of national reputation have given these instruments their unqualified endorsement. They are sold to you with an absolute guarantee that is backed by a **ten day free trial offer.**

FULL PARTICULARS and descriptions of these high grade instruments, and details of our extraordinary selling plan, will be sent upon request.

A. S. Aloe Co., 515 Olive St., St. Louis, Mo.



Quality

is of course the most essential requisite of a lathe for **Garage** work, as well as for **Automobile and general repair work.** We have it in our lathes, but we have kept the **price very low.**

We would be glad of an opportunity of convincing you that we offer both **high quality** and **low price** in the **Sebastian** Lathe. Our catalog free.

The Sebastian Lathe Co.
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SINGLE MAHOGANY LOG WORTH $14,000—A log, one of the finest specimens of African mahogany, arrived in Liverpool from the port of Axin, was acquired, in competition from nearly every civilized country in the world, by a New York firm, which paid $14,000 for it. This is one of the highest prices ever paid for a single mahogany log.

New Typewriter

Typewriters cost too much and are too heavy for general use. The wonderful Bennett Typewriter costs *only* $18, brand new—is light, and easily carried for home use, business or trips. Does all the work of high priced machines.

Sent on Approval

Money back if not satisfactory. Write for catalog and trial offer. The Bennett is low priced because so simple. Only 250 parts. Others have 1700 to 3700. Built in famous Elliott-Fisher Billing Machine factory. Write today. Live agents wanted.

Q H Bennett Typewriter Company
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FREE If interested in Tool Grinders, send for our new booklet "A Sharp Edge in a Hurry." If you enclose 4 cents for packing and mailing, we'll include **FREE** a Pike India Vest Pocket Stone, also our famous book "How to Sharpen."

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PIKE MANUFACTURING CO., 100 Main St., PIKE, N. H.

FOR SEWING LEATHER

The **Speedy Stitcher** is the latest and best of anything ever offered for $1.00.

Agents make over 200% profits.
Send at once for catalog and terms.

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illustrating True-Tone band and orchestra instruments, violins, drums, drummers' traps, etc., also

"HOW TO ORGANIZE A BAND"

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BUESCHER BAND INSTRUMENT CO.
ELKHART, INDIANA

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Our announcement pertaining to our new "Drilhammer"—Drills ten times faster than by hand—will appear in the November issue of this magazine. Send for an advance copy of our descriptive booklet.

ORR & LOCKETT HARDWARE CO.
14-16 W. Randolph St. CHICAGO

SIDE VIEW

TOP VIEW

NEW IMPROVEMENTS WITH COMPASS NOW MAKE

The American Combined Level and Grade Finder

Most Practical, Durable and Convenient Instrument Made

At one glance you can get the true slant on any line or grade either in degrees, inches or percentage, or all at the same time, and will at once give the exact distance needed to plumb up to a true level. The additional spirit level glass now placed in middle of instrument with points on dial will give 3 grades for leveling. The longitudinal recess shown in cut is well worth the low price of the instrument. Write AT ONCE for circular and Testimonials. Special Introductory Price given to First Applicants with privilege of taking Agency. Address **EDWARD HELB, Mfr., Box 75, RAILROAD, PENNA.**

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A big 224-page Catalog of Millwork and Building Material, containing cuts and net prices of 8,000 money-saving bargains. A handsome Plan Book of Modern Houses, bungalows, summer homes, barns and ready-built garages, showing 60 splendid exterior views with floor plans, priced from $80 to $4000. Don't pay dealers' prices—we sell direct, factory to user. You can save money.

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Save their cost in coal bills. Makes home comfortable in winter.

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AMERICA'S GREATEST SASH AND DOOR HOUSE
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ODD ANIMAL INTERIORS—Four cows of Watertown, N. Y., and one hen of Bayonne, N. J., revealed themselves as possessed of most remarkable interiors recently. The cows strolling through a meadow came to a fence near which some workmen had temporarily laid a dozen sticks of dynamite. The cows considered the dynamite in the day's eating task and proceeded to swallow and prepare the sticks for future cud chewing. The horrified workmen arrived on the scene just as ten of the sticks had disappeared. They grabbed

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Men and Women can do this all the year at home growing mushrooms in cellars, stables, sheds, boxes, etc. Crop sells for $.50 to $1.00 a lb. $20.00 a week easily made. Great demand, markets waiting. **Start Now.** Write for big 32 page **Free Illustrated Booklet** and learn how to do it.
NAT'L SPAWN CO., Dept. 12, BOSTON, MASS.

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A good standard make used piano is a better investment than a cheap new piano. We carry a large stock of used standard make pianos, taken in exchange as part payment on new Starck Pianos and Player Pianos. Prices $75.00 to $195.00. 30 days' free trial; easiest payments; **50 FREE MUSIC LESSONS.**
WRITE TODAY FOR BARGAIN LIST.
P. A. STARCK PIANO CO., 387 Starck Building, Chicago, Ill.

BE YOUR OWN BOSS
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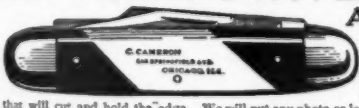

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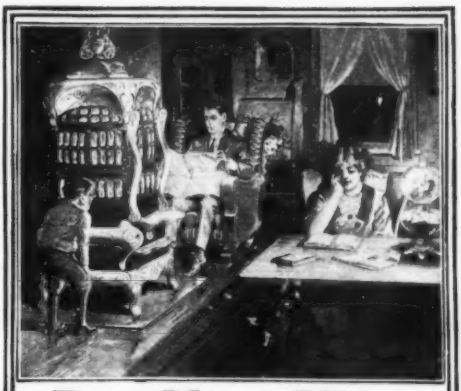
Golden Rule Cutlery Co., 552 W. Lake St., Dept. 207, Chicago



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We give credit to home lovers—give it gladly—on terms which no one else ever offered.

No references required, no contract, no mortgage. We open your account when we mail you our catalog. Order when you wish.

We make this offer after selling on credit for 48 years, and to 1,200,000 homes.

Pay 3 Cents a Day

Pay a little each month by saving up just 2 or 3 cents a day. If sickness comes, or loss of work, ask for extra time. We have no collectors. There will be no interest, no extra price, no annoyance of any kind.

Goods will be sent on 30 days' trial, subject to return. If you return them, we pay freight both ways.

And we guarantee to save you from 15 to 50 per cent under the lowest prices others quote. Return the goods if we don't.

Dollar Book Free

Our Fall Bargain Book is a mammoth book, which costs with the mailing $1 per copy. It pictures 4,918 things for the home, many in actual colors.

We mail this book free, and we want you to have it. With the book we will send your credit certificate showing your charge account.

In writing us, kindly state what articles in the list below will interest you most. We have special books on some of these lines which we also will send if wanted.

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Spiegel, May, Stern Co.
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Please check the lines in which you are interested, as we have special books on some lines.

..Furniture ..Watches—Jewelry
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Give full address. Write clearly.

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are a constant tax upon mental, physical and nervous forces. The effects of concentration, worry and overwork soon become evident. Unless proper nourishment for brain and nerves be provided, complete breakdown is the inevitable result.

Pabst Extract
The Best Tonic

quickly dispels the effects of overwork, nerve exhaustion and brain-fag. It feeds the nerve centres, strengthens the muscles and quickly restores both mind and body to a normal, healthy state.

Order a Dozen from Your Druggist

Insist Upon It Being "Pabst"

FREE BOOKLET, "Health Darts," tells all uses and benefits of Pabst Extract. Write for it.

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RIFLES and SHOT GUNS ON CREDIT

THIS ACCURATE, STRONG-SHOOTING, HAMMERLESS SHOT GUN

$4.50 DOWN

Price $17.50

This high grade shot gun is fitted with Rummel's No. 14 Armory Steel barrels, full tapered choke, bored for either black or smokeless powder—12 or 16 gauge, 28 or 30 inch lengths, 7½ to 8 pounds. Top lever action—hammers cock and throw safety automatically. **Sent for $4.50 Down and $2.00 a month—no interest—no extras and you have 7 months in which to complete payment** on this gun that will compare favorably with any $40 or $60 gun made. **Every man wants a good gun,** but not every man can afford to pay the full amount cash down—therefore, we have **just lately** decided to sell **high grade fire arms on**

CONFIDENTIAL CREDIT

If you want a guaranteed shot gun or rifle why not open a credit account? We have been selling high grade guns for thirty-five years.

Write us for Complete Information and Catalog

A. J. RUMMEL ARMS COMPANY

302 St. Clair Street Toledo, Ohio

the remaining two and fled. The cows were watched by the angry and apprehensive owner for quite a time, but nothing exploded.

The hen swallowed something that made it gape and open and shut its eyes a dozen times a second. She was a fine breed of hen and the owner was a veterinarian. He slit open her crop, took therefrom a small roll of emery paper, sewed up the crop again with silk thread and looked to see a very sick hen stagger off

Regular Salaries Better Than Commission Only

I'll make a regular **weekly salary** offer to any man or woman who wants to act as my representative and devote four hours every day selling my world beating line of Toilet products, Soaps, Perfumes, etc. I want honest men and women quick. No experience necessary. I'm an old agent myself. I will show you how to make $25 to $50 per week. I couldn't afford to pay a *regular salary* if the goods were hard to sell. It's a cinch—the big bargains almost sell the goods themselves. Seventeen years in business. Pay day every Saturday—no bonds or references. I will furnish most attractive outfit. Simply send name and address on postal and say "send full particulars—weekly salary offer." I want to put you on the payroll immediately.

E. M. DAVIS, Pres.

E. M. DAVIS SOAP COMPANY, Dept. L14, Chicago

Need a Good Flannel Shirt?

Look these over. The makers of the widely worn Signal line make Signal Flannel Coatshirts of first class, quality-tested flannels, carefully cut and perfectly sewed by expert union workmen, with numerous unusual and ingenious comfort features added to give you extra value.

Signal FLANNEL Coatshirts

UNION MADE

You know what these mean in a shirt:

Big armholes, roomy elbows, full length sleeves, wide cuffs, and a gathered yoke at the back of each shoulder. You couldn't get greater arm-freedom with your shirt off. Flaps that overlap each other a full 3 inches in front. Combination watch and handkerchief pocket, with a flap you can button. Cut coat style with full length body. Extra button at bottom of breast plait to prevent gaping. Satin-lined military collar.

Signal Flannel Coatshirts give more actual wear than similarly priced shirts, and about twice ordinary comfort. They are sold in a variety of desirable patterns by most all dealers for $2.00, $2.50, $3.00 and $3.50. Whatever you pay, count on double that amount in value.

We also manufacture a splendid line of Signal Workshirts, sold by our dealers at $1.00, which have the same remarkable comfort features of Signal Flannels. If you don't find Signals at your particular dealer's, give us his name and let us send you some sample swatches and a descriptive booklet.

If you don't need shirts today tear this out as a reminder, for you can't afford to get less value for your money by buying any shirts but Signals.

SIGNAL SHIRTS

HILKER-WIECHERS MFG. CO.
1256 Mound Ave., Racine, Wis.

Manufacturers of Signal Service Shirts

to lie down and very likely die. Instead she went to her nest box and promptly hatched out ten chickens.

◆ ◆ ◆

ANCIENT EGYPTIANS USED ROUGE—The "tear bottles" which women of the Orient carried centuries ago reveal the hypocrisy of the women. Several of these bottles are included in a collection of glassware which has been bought for $13,000 for the

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The Toy That Resembles Structural Steel

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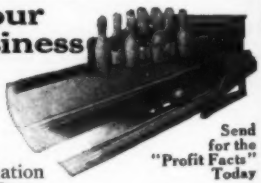

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to her eyes she was just daubing powder over a red spot on her cheek.

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◆ ◆ ◆

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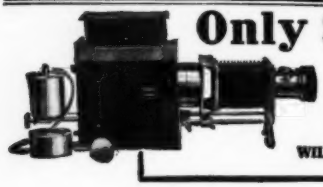

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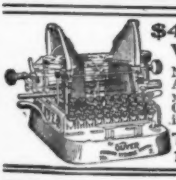

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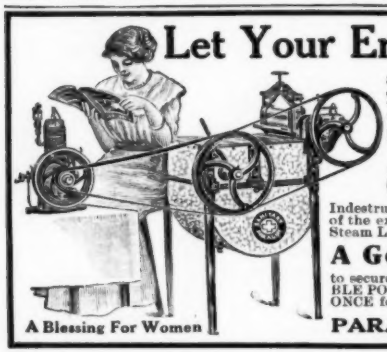

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and make an end to washday drudgery in YOUR home. Of course, NONE of the unsanitary, old-fashioned wooden rotary washers will do. ONLY THE MOST UP-TO-DATE machine ought to be good enough for YOUR wife. EXPERTS will tell you that NO MORE DURABLE and PRACTICAL washer can be found than the famous

All Metal Sanitary Paragon Revolving Cylinder Power Laundry Machine

Indestructible. NO WOOD used in any part. The PARAGON is a true reproduction of the expensive and powerful Cylinder Washers exclusively and successfully used in Steam Laundries, Hotels and Hospitals. Over 100,000 Paragon Washers used in the U. S.

A Golden Opportunity for 30 Days Only

to secure one of these wonderful genuine laundry machines, complete with REVERSIBLE POWER WRINGER at a very considerable REDUCTION in price, if you write AT ONCE for Catalog No. 1 and further details of the most generous proposition made.

PARAGON MFG. CO., 2401-03 W. 14th St., CHICAGO

THE BEST WATCH ILLINOIS ON EASY CREDIT

Send for our handsome *Free* Catalog and select your Illinois Watch—the watch that is *sure* to meet your demands for accuracy, wear and beauty. Every model guaranteed absolutely by both the manufacturer and ourselves, and sent you *prepaid* subject to your satisfaction—if you like it, you keep it and *pay only a small amount each month.*

The Highest Grade Watch

We are an exclusive Illinois Watch House selling the highest grade of Illinois Watches *only.* Don't confuse the Illinois Watches *we* sell with offers made by department stores, general mail order houses and dealers, who handle various inferior grades of watches as a side line. When you buy from *us* you are *absolutely protected* in getting the *best* watch, *because all models sold by us contain 17 jewels or more, adjusted to 3 positions or more, besides adjusted to temperature and isochronism.*

Freddro Terms Easy To Pay

Easy Credit Terms

You *can't* duplicate the Illinois Watches *we* sell at *our* prices on credit terms, with the 25 year guarantee and service that *we* give. Sent on approval any where. We do as we say we do—live up to every assertion in our guarantee. Handsome Catalog FREE. Write *today.*

Freddro Watch Co.
Dept. 300 St. Louis, Mo.

Freddro Watches Will Please You

tion, when bent breaks under a stress of 13,660 lb., its nearest rival being a variety of the hickory called mockernut. When bent by the impact of a 100-lb. hammer it stands a stress of 15,520 lb., certain sugar maples and the honey locust being its nearest rivals. It exceeds the hickories, and its only rival in hardness, tested by the force required to imbed a .444-in. ball to one-half its diameter, is the honey locust.

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Sold on trial and Guaranteed
Saves its cost in fuel alone over and over again, saves time and labor. Irons better and anywhere, no wires or tubes to connect, always ready.
We have a big money making Proposition for live Agents.

Write Us For Descriptive Circular and Special First Order Offer.
MODERN SPECIALTIES CO.
108 High Street South Bend, Ind.

8½ Pound
Electric Suction Cleaner

At last a suction cleaner a woman can handle as easily as a carpet sweeper. Weighs no more. Takes up only two-thirds as much room. Can be packed away in small box. Rolls on rubber-tired wheels—moved without effort. More powerful than big unwieldy machines.

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10 Days Free Trial

We take all the risk. Write today for our Free Book. Just send a postal with your name and address.
THE MORROW COMPANY, Dept. 1197, Waukegan, Ill.
Good Territory Still Open—Agents and Dealers Write

Billiards for Boys
of Sixteen to Sixty

The "Baby Grand"

Cultivate "the play spirit"—it pays in *health* and *efficiency.*

Play billiards or pocket-billiards *at home* —on the matchless "Baby Grand." Billiards is the finest of all indoor games for boys of sixteen to sixty.

Good exercise for body and brain. Relief from business *tension.* Pure, unadulterated *fun,* with just enough spice of *rivalry* to give *keen zest* to the game. The

Brunswick "Baby Grand"
The Home Billiard Table de Luxe

These superb Billiard and Pocket-Billiard Tables are found in thousands of refined homes throughout the world.

They are billiard tables for rooms of average size, on which *real billiards* can be played. Made of finest Mahogany, with classic inlay design.

Fitted with genuine Vermont Slate Beds, covered with Imported Billiard Cloth; Baby Monarch Quick-Acting Cushions; Concealed Cue Rack and Accessory Drawer for entire playing equipment. The same accurate angles and scientific construction as Brunswick-Balke-Collender *regulation size* tables, which are used exclusively by the billiard experts of the world. Furnished as Carom Billiard Tables, Pocket-Billiard Tables or Combination Carom and Pocket-Billiard Tables. Sizes 3x6; 3½x7; 4x8 feet.

Brunswick "Convertible" Billiard Tables

These ingenious tables make *any* room available for billiards—dining room, living room, library or den. Three styles—The Davenport-Billiard Table, the Dining-Billiard Table, and the Library-Billiard Table.

Equal in playing qualities to the "Baby Grand." When not in use for billiard playing, they serve as handsome, practical pieces of household furniture.

Over A Year To Pay

We sell Brunswick Home Billiard Tables *direct from factory* at very moderate prices and exceptionally easy terms.

Playing Outfit Free

with each table, including cues, balls, cue rack, markers, Book of Rules, "How to Play," etc., etc.

Free Color-Illustrated Book "Billiards—The Home Magnet"

This beautiful book describes and illustrates in actual colors the complete line of Brunswick Home Billiard and Pocket-Billiard Tables. Quotes lowest factory prices. Gives details of Easy Purchase Plan and much valuable information. Write for your copy today. (116)

The Brunswick-Balke-Collender Co.
Department HS, 623-633 S. Wabash Avenue, Chicago

Gentlemen:—Please send to the address below, your book,

"Billiards—the Home Magnet"

Name.....

Address.....

Town.....*State*.....

Be Well Dressed We Trust You

Send your name and address for our big new 1913-1914 **Fall and Winter Style Book.** It's absolutely FREE FOR THE ASKING and contains all the newest fashions and free samples for this season's wear.

Our Prices Lower Than Cash Tailors

We guarantee you'll save big money, for our prices are ABSOLUTELY LOWER than those asked by cash tailors; and we'll give you all the credit you want. We help you dress like the best.

Made to Order to Your Own Measure

Our garments are all made-to-order—MADE FOR YOU YOURSELF, from the measurements you send us. They're not "ready-mades" altered to meet your requirements. COMPARISON PROVES the superiority of our woolens and tailoring.

We Have No Agents, Collectors or Canvassers

Shipped On Approval

You run no risk whatever. You're sure to be **pleased in every way.** We guarantee **to fit you perfectly** and thoroughly satisfy you or you get your money back.

Six Months to Pay

No matter where you live, we trust you. Your simple promise to pay us in six months is sufficient. Our confidential charge account **credit plan** is one of the most modern conveniences of the day.

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Now don't delay—write for our big encyclopedia of Fall Fashions TODAY—GET YOUR POSTAL RIGHT OFF IN THE MAIL—We will send the book postpaid as soon as we receive your name and address. WRITE TO

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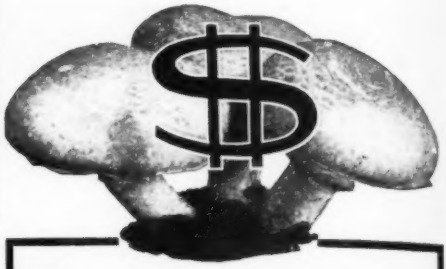
536-538 So. Clark Street Chicago, Illinois
World's Foremost Credit Tailors for Men

When you want anything and don't know where to find it—write Bureau of Information, Popular Mechanics Chicago



The Truth About Mushrooms

Big, Quick Profits. Small Capital. Now Is Best Time.

Biggest, quickest, surest and easiest money-maker is growing mushrooms. Bigger money is being made in mushrooms now than ever before, by those who are today putting in practice the great revolutionary improvement in mushroom culture explained in our new book, "The Truth About Mushrooms." Open your eyes to an opportunity you never realized. No matter what your occupation or location, you can now

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without interference with present work. Small capital to start. Men and women can easily do it. Now is time to start. This great book explains everything from A to Z, and things which even many mushroom growers never knew before. Get first-hand information from the greatest practical authority. Start in the world's best-paying business now. Grow in cellars, sheds, boxes, etc., or increase your profits many fold if you are already a grower. Send for the free book today sure.

Bureau of Mushroom Industry, Dept. 77, 1342 N. Clark St., Chicago, Ill.

SEATTLE'S NEW DRY DOCK—The new 12,000-ton floating dry dock, which was completed early this year, is a valuable addition to the port of Seattle. Some of the larger vessels of the United States, which in the past have had to be docked at the Puget Sound Navy Yard, will now be able to avail themselves of the excellent facilities offered by this dock. It is 468 ft. long, and will be increased later to 600 ft.; 110 ft. wide, and has a 30-ft. draft over the sill.

TRY IT YOURSELF FOR 10 DAYS WITHOUT DEPOSIT

If not satisfactory, return it and no questions asked. **DAUS IMPROVED TIP TOP DUPLICATOR** with "Dausco" Oiled Parchment Back negative roll is the result of 25 years' experience and is used and endorsed by thousands of business houses and individuals. 100 copies from pen-written and 50 copies from typewritten original — **Clear, Clean, Perfect.** Complete Duplicator, Cap size (prints 8 3-4x13 in.), price - - **$5.00**

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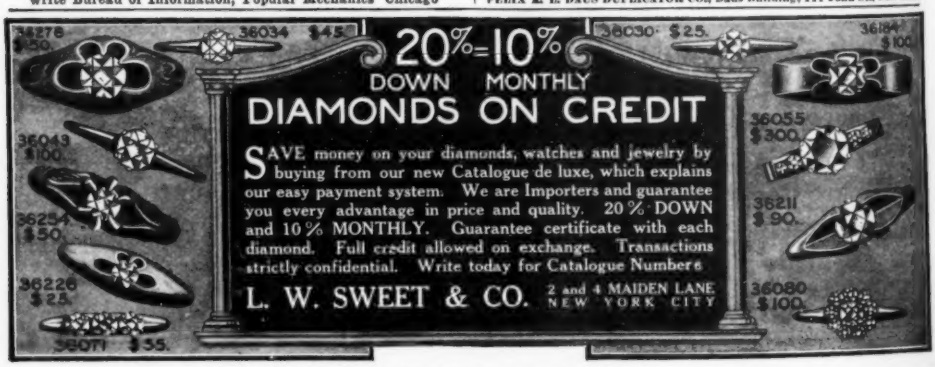
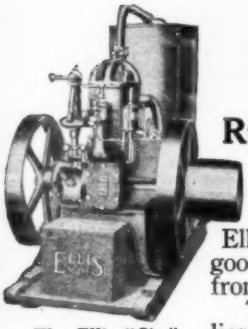




The Ellis "Six"

42c a Day

Runs this 6 H. P. Engine on Kerosene

This statement as to fuel cost is not a theory that we would like to realize, but is based on actual working conditions in our factory where Ellis Engines are used for our own power. Equally good results can be secured from other sizes, ranging from 3 to 12 H. P.

The big advantage of a **successful** kerosene engine lies in the fact that this fuel is not only much cheaper to buy per gallon, but it also contains one-sixth more power than gasoline; in other words it takes 7 gallons of gasoline to do as much work as 6 gallons of kerosene **when used in Ellis Engines.**

Don't miss the last five words, **"When used in Ellis Engines."** That's the secret of the low cost. It isn't the kerosene alone; it's kerosene **used in Ellis Engines.**

No engine will use kerosene successfully unless it was designed especially for that fuel. You can burn wood in a coal stove, but you can't burn coal in a wood stove; and it is equally true that while you can use gasoline in a kerosene engine, you can't use kerosene in a gasoline engine.

Read What These Men Say

"I run my engine on kerosene which costs only half as much as gasoline and gives more power. It is one of the best engines I ever saw; so easy to operate."
W. M. Dixon, Landover, Md.

"Can get more power from 12½c worth of coal oil than from 30c worth of gasoline. The Ellis people are among the best with whom I have done business."
W. J. Wraith, Lucknow, Ontario

"After it is warmed up it runs fine on either Distillate or Coal Oil, and will do more work on a gallon of gasoline than any engine I have ever seen."
E. F. Showers, Ferndale, Wash.

"One turn of the fly wheel in the morning and it is off for the day. It is one of the most economical engines on the market." **R. C. Maurer, Elizabethtown, N. J.**

"Have given the Ellis Engine a thorough trial on pure kerosene. It is simple to manage and the power is more than I expected, and am very much pleased with it." **T. Scandrett, Mullett Point, New Zealand**

"The engine has big power. Runs on common lamp oil satisfactorily. Everyone who sees it says, 'I never saw the like.'" **J. J. Friesen, Meade, Kans.**

"Even with kerosene at 22c a gallon, I am saving fully 50% of the expense I was put to when using my steam outfit." **Juan Long, M. D., Musquiz, Coah., Mexico**

Thousands of others could say the same

Other Strong Features

Every Ellis Engine is equipped with our own exclusive patent throttle giving you **three engines in one**; force-feed lubricator positively oiling all working parts; double duty cooling tank (a great convenience in severe weather); ball-bearing governor adjustable while running, and guaranteeing uniform speed; extended crank shaft suitable for any standard plain or clutch pulley; high-grade muffler; sight feed fuel supply; bearings die-cast of genuine Babbitt metal; bronze piston bushings, copper asbestos gaskets, and other special equipment.

And remember too, that while the Ellis Engine is light in weight, it is strong enough to last a lifetime; starts without cranking; has no cams, push rods or springs to cause trouble or wear out; is of very simple construction; runs with less vibration; will run equally well in either direction and can be reversed while running.

The larger sizes are equipped with Wico Igniter (better than any magneto), and device for injecting water with kerosene.

Sent on Approval

We are so confident our engines will more than satisfy any reasonable man, that we send them anywhere in America on **30 days' approval with freight prepaid,** and then the engine is backed by a binding and definite **10-year guarantee.**

Write today for big new catalog and opinions of satisfied users in all parts of the world.

The Ellis 2-cylinder "Twelve"

Ellis Engine Company

64 Mullett Street Detroit, Mich.

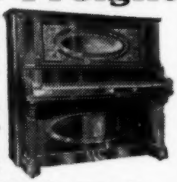
3 Years to Pay

for the Sweet-Toned

Meister Piano

$175

30 Days' Free Trial We Pay the Freight



You are not asked to **deposit**, or **pay** or **advance** a cent in **any way** until you write us and say that the MEISTER is entirely satisfactory and you wish to keep it. **Then these are the terms of sale:**

$1 a Week or

$5 a Month

No cash payment down. No interest on payments. No extras of any kind. Piano stool and scarf free.

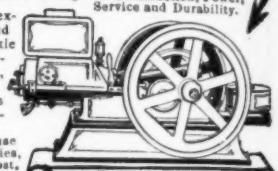
Sold direct from the maker to you at a guaranteed saving of $100. No dealer's profit for you to pay.
Send now for our beautiful **Free Catalog**, which shows eight styles of Meister Pianos.
Our resources exceed $4,000,000. We sell more pianos direct to the home than any other concern in the world.

Rothschild & Company
Dept. G 16, Chicago, Illinois

Cheaper Power for Every Purpose

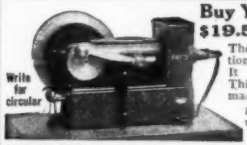
The **WATERLOO BOY GASOLINE ENGINE** will run all day without attention, furnish exactly the power you need, maintain a uniform speed and save you money every hour it works. Uses either **Kerosene or Gasoline for fuel—equipped for both at no extra charge**

The recent award of **Gold Medal** at Budapest, Hungary, *in open competition with the best engines of all countries* is clinching proof that the **Waterloo Boy** leads the World in Construction, Power, Service and Durability.



Has many important exclusive features—Speed Lever works like throttle on a locomotive; old reliable fly ball governor, automatic feed regulation, open jacket, starts easy in Winter, interchangeable parts, etc.
Lowest in price because made in largest quantities, at low manufacturing cost. *Guaranteed 5 Years.* Book free. Write today.
Waterloo Gasoline Engine Co.,
1021 W. 3rd Ave. Waterloo, Iowa.

Awarded Gold Medal First Prize at the International Gasoline & Oil Engine Show Budapest, Hungary



Buy Your BOY One of Our $19.50 Gasoline Engines

The educational value of this proposition to a boy cannot be over estimated. It will prove a good investment. This little engine will run a washing machine, small cream separator, grinder, corn sheller or any small machine. Shipped on trial. Fully equipped, ready to run.

SIEVERKROPP ENGINE CO., 1224 18th St., Racine, Wis., U. S. A.

Don't Buy an Engine

until you investigate the famous TEMPLE **Gasoline-Kerosene,** slow speed, heavy duty, all-purpose engines. Bulk and weight less than horizontal engines; **cylinders built low,** close to base, eliminating shock and vibration, increasing strength and durability, and giving scientifically correct distribution of strain. **Pay for themselves in fuel saving alone. Have won five 1st premiums for low operating cost, stability and steady power.** Old reliable pioneer concern (manufacturers for 61 years) guarantees these engines. Write today for catalog and particulars of 30-day trial offer.

THE TEMPLE ENGINE & PUMP CO., 435 Meagher St., Chicago, Ill.

LARGE YIELD OF CALIFORNIA OIL FIELDS—Statistics for the first six months of 1913, including the estimated June figures, credits the California oil fields with a total output of 47,250,000 bbl., an increase of about 935,000 bbl. over the final half of 1912. Total consumption for the half year is placed at about 47,800,000 bbl., a gain of more than 4,200,000 bbl. over the record of the preceding six months.

Small Gas and Gasoline Engines

Air and Water Cooled. ¼-½ and 1 H.P.

Unsurpassed for laboratory, experimental work and for operating washing machines and light machinery. Can be used for small individual electric light plants: complete circulars for stamp, also big catalogue of steam engines, boilers, pumps, electrical goods for 10 cents (coin preferred) refunded first order. If in need of an engine write today.

AMATEUR MECHANICS SUPPLY CO.
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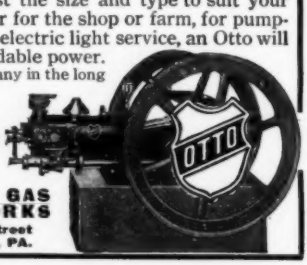
OTTO KEROSENE OIL AND DISTILLATE ENGINES

are built in just the size and type to suit your needs. Whether for the shop or farm, for pumping, hoisting or electric light service, an Otto will give you dependable power.
Costs the least of any in the long run. All sizes, 4-6-8-10 up to 120 H. P. Gas Engines up to 250 H. P. Catalog and bulletins free. Dealers wanted everywhere.



THE OTTO GAS ENGINE WORKS
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I H C Gasoline Engines Make and Save Most Money

They are most dependable, simplest, most economical, most efficient, most durable and strongest, and they are adaptable to most kinds of work. I H C Gasoline Engines are made in all styles, 1 to 45-horse power. Write today for the I H C catalogue, and read about the I H C engine that meets your needs best.

Address, INTERNATIONAL HARVESTER COMPANY of AMERICA (Incorporated)
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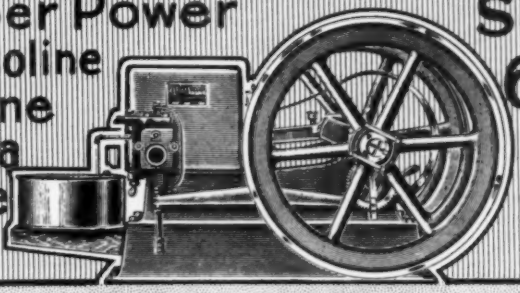
2¼ HORSE POWER

HERE is the most reliable 2¼ H. P. Engine in America. It gives such perfect satisfaction that we ship it anywhere in the world on terms of only one-half the purchase price or with your order and six months' time on the balance. If you want an engine any size, 1½ to 12 H. P., write me today for Big 4-color Engine Catalog and Price List, lowest you ever heard of. Save you $20 00 to $100.00 sure. Do it now—today.

only $24.75

OTTAWA MFG. CO., 946 King St., Ottawa, Kans.

Cheaper Power from Gasoline Kerosene Naphtha Distillate and Gas.



Sold on 60 Days Free Trial.

The Famous WITTE Engines

You can't buy any better engines for any price, and none as good for my price!

That's my offer in a nut shell.

And I sell on any easy, reasonable terms, if you don't choose to pay cash—and **I don't raise the price,** for this accommodation, either.

You get, right direct from me, backed up by over $250,000.00, a **full 60-days' free trial** on any **WITTE** of your selection. I make **54 styles and sizes,** from **1½ H-P. to 40 H-P.**—a size and style for all shop, factory or farm work—**Stationary, Portable, Skidded** and **Sawrig** styles.

I am the only man in the U. S. making his own engines in his own factory, from his own designs, using his own patterns and special machinery, and selling his entire output **Direct from his Factory** doors to the Users' hands. There is no middleman between me and any prospective engine-user, anywhere on earth. Fast mails and fast freights give our customers quick service to all points. I ship engines to every state of the Union, every day.

Five-Year Guaranty

I insure every **WITTE** Engine to make good, by guaranteeing it for five years against defects, and any consequent faulty operation.

ED. H. WITTE

I Sell only Direct from my Factory to Users, at Strictly Factory Prices.

My factory is one of three of the first ones in America, making successful gasoline engines. For 27 years, the **WITTE** has always proved itself reliable—easy to understand and run—steady power, and small fuel consumption. No gas or oil engine can out-last the **WITTE,** and very, **very few** of them can work on so little fuel.

I have written a New Book to tell the inside of the engine **selling,** as well as the manufacturing, business. Everybody who has seen it, tells me it is worth dollars to everyone who has steady work to do.

No need now to pay double price for a good engine, or to take a poor engine for any kind of a price. Under my plan, you are sure of knowing what any engine **ought** to do, besides knowing what my engine **can** do, before you finally decide to buy any kind. My New Plan of Direct Selling makes it easy for you to be your own engine agent, and to make for yourself the full dealer's profits.

My Most Understandable Engine Book

Will Be Mailed To You Absolutely FREE

WITTE ENGINES Sold only Direct from Factory to user Send the Coupon for the great Free Engine Book

Send me your address to-day, so I can send you **free,** and **postpaid,** My **Great New Book,** that tells you, better than any other, How to Judge an Engine—how to pick the winner. Use the Free Coupon at the right.

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FILL OUT AND SEND ME THIS COUPON RIGHT AWAY

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Without any obligation on me, send me **free** and **postpaid,** your New Book, and your Special Offer under your New Plan of Selling.

Name _____

Address _____

How FESLER Agents Build Up an Equity For Themselves

THIS is the FESLER FOUNTAIN SHAVING BRUSH, and its distribution offers the best and most equitable agents' plan ever perfected. The agent who sells this brush not only makes an immediate and generous profit, but he begins at once the creation of an estate—*an equity*—that in five years runs into *five figures!*

Your Action In This Matter Should Be Immediate.

Agents and salesmen seeking a rich side-line, should write at once for full particulars. We have a sales-plan unequalled in its broad possibilities, and unique in the history of agency propositions. No matter what you are now selling, or how much you are making at it, we can increase your income, and create a business that will pay you profits for years to come.

If you want to try a brush, one will be sent prepaid on receipt of $1.00.

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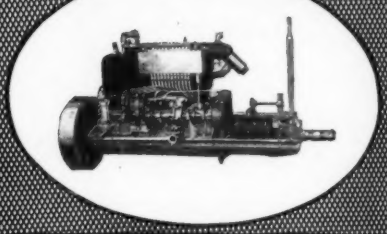
258 W. Twenty-third Street, - - - New York



"Buffalo" Marine Engines

"Buffalo" four-cycle marine engines are built in 20 models—3 to 150 h. p.—in slow, medium and high speed designs, for powering work boats, speed boats, launches and cruisers of all kinds.

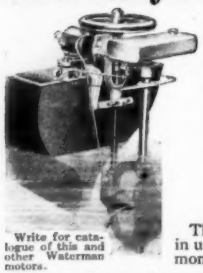
They can be operated on gasolene or kerosene.

The strong points of "Buffalo" engines are reliability and economy.

Shall we send you the "Buffalo" Book? It tells the whole story.

Buffalo Gasolene Motor Co.
1293-1305 Niagara St., Buffalo, N. Y.

Makes Any Boat a Motor Boat



Write for catalogue of this and other Waterman motors.

This simple, light boat engine makes a motor boat of any boat in a jiffy—as quickly detached. Will take you 28 miles per gallon of gasoline in an 18 foot boat.

Seven miles an hour in a rowboat!

The most Power for the Price.
The most Power for the Weight.

"PORTO"

2 Full H. P.—55 Lbs.

The original, portable motor—20,000 in use, guaranteed a year and sold on a month's trial.

Waterman Marine Motor Co., 230 Mt. Elliott Ave., Detroit, Mich.

AFRICAN OSTRICH FARMING—In the Union of South Africa there are 746,736 ostriches, according to a consular report, and of this number 728,087 are in Cape Province. The weekly sales there average more than 1,000,000 feathers, not including the lowest grades.

POPULAR PLEASURE AND PRICE IN THIS 16-Ft. Family Launch

SEND FOR OUR LIST OF BARGAINS

THE VALLEY BOAT & ENGINE CO. 1206 Hess Street SAGINAW, MICH.

GRAY MOTORS FOR BOATS

Largest Builders of 2-cycle Motors in the World. Over 1000 responsible dealers.

3 H.P. with Complete Outfit ready to install $55
ALSO ASTO 36 HP

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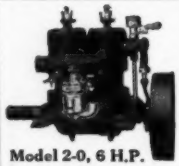

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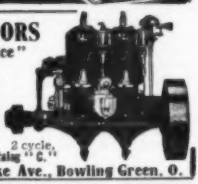

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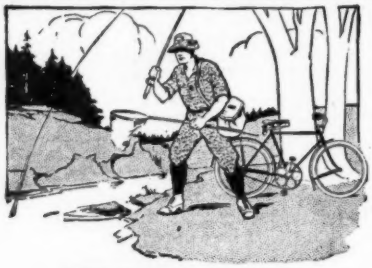

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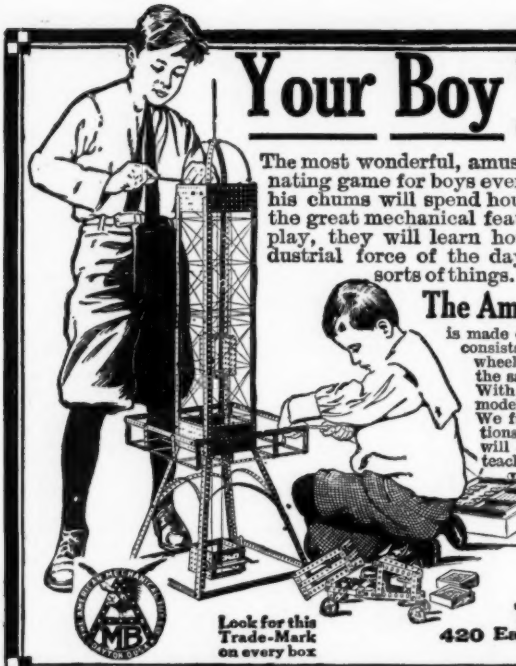

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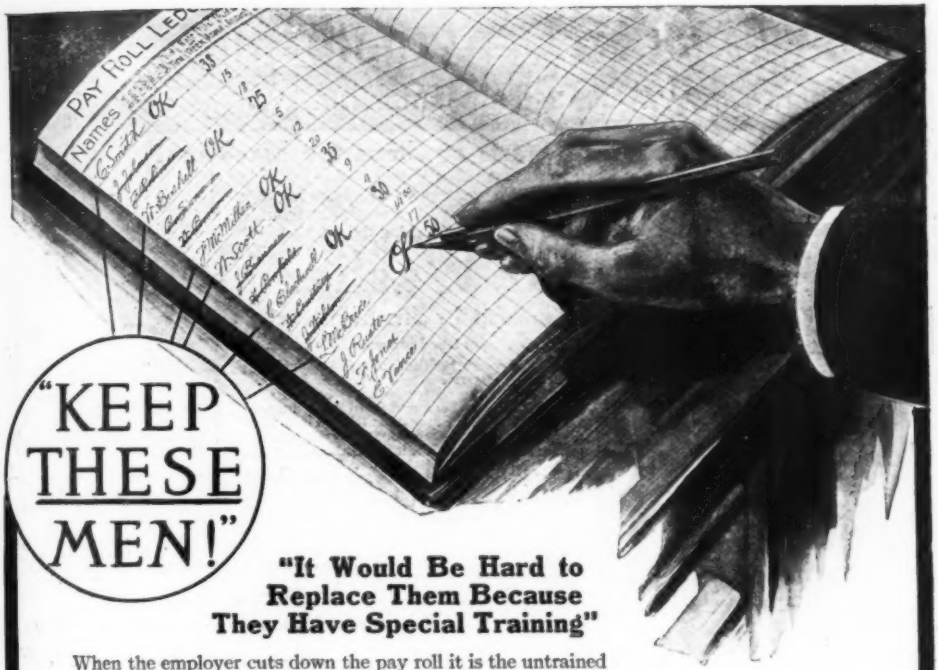

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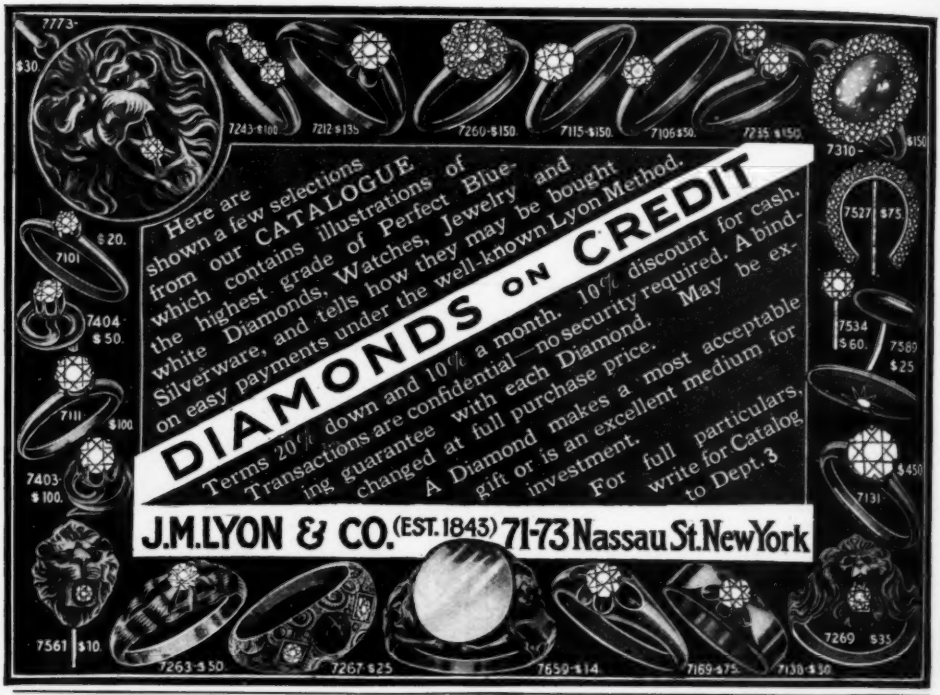

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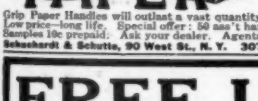

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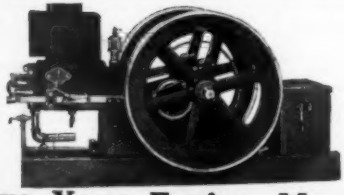

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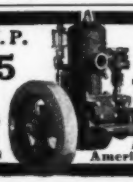

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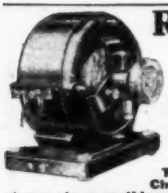

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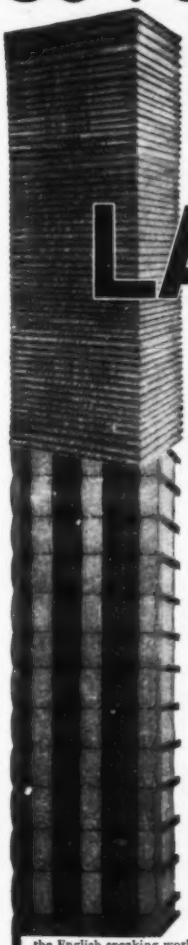

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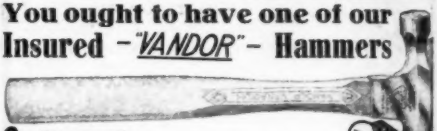

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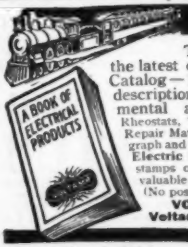

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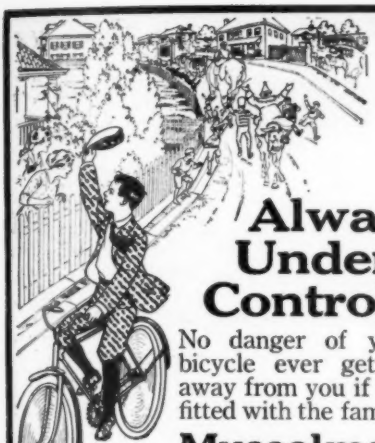

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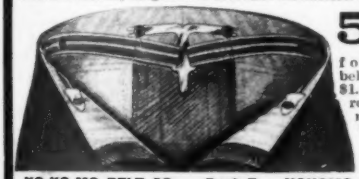

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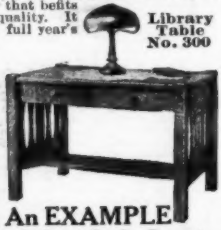

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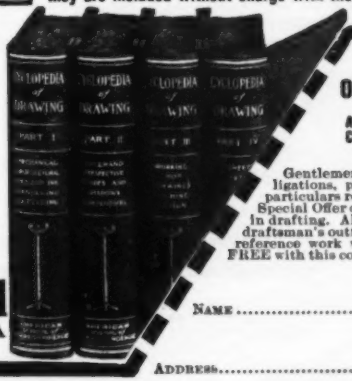

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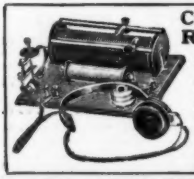

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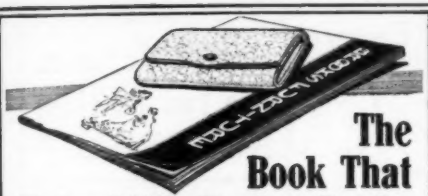

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A One Minute Camera

that takes and finishes pictures in one minute.
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By Parcel Post 50 Cents Extra

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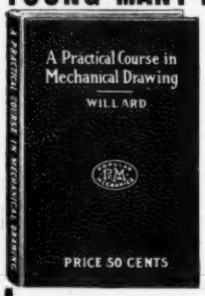

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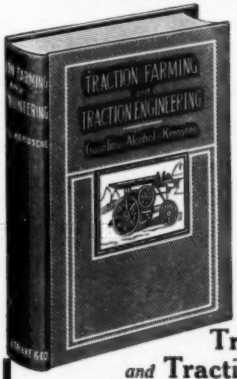

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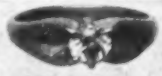

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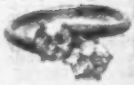

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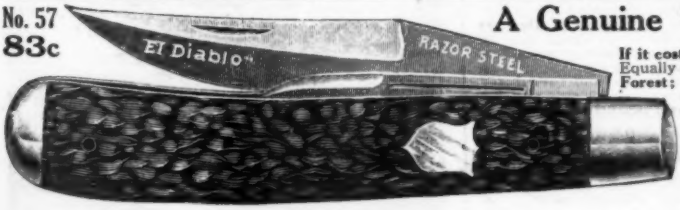

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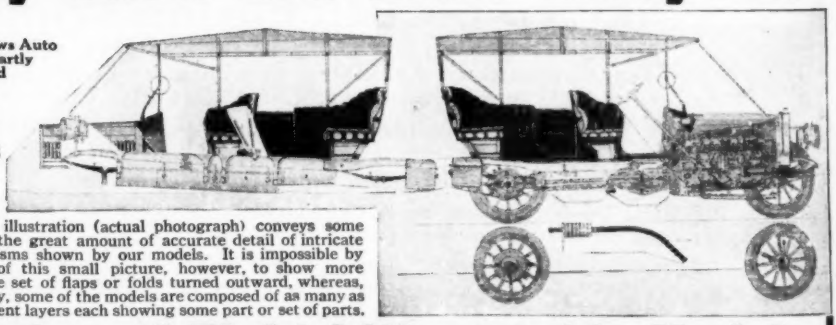

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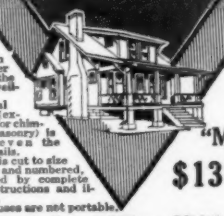

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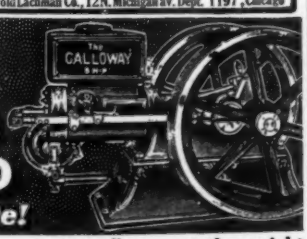

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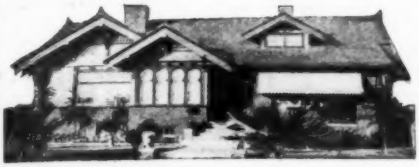

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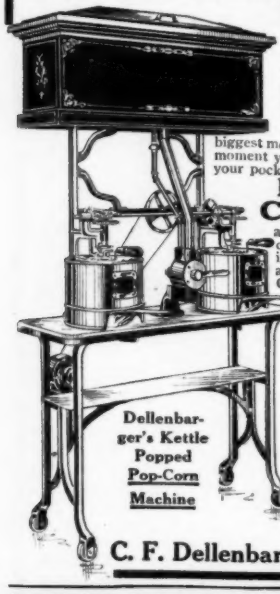

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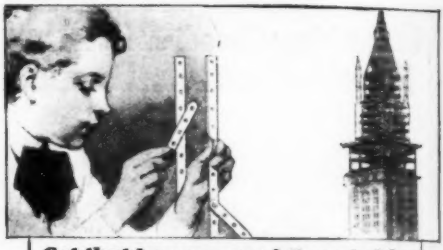

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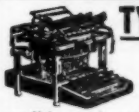

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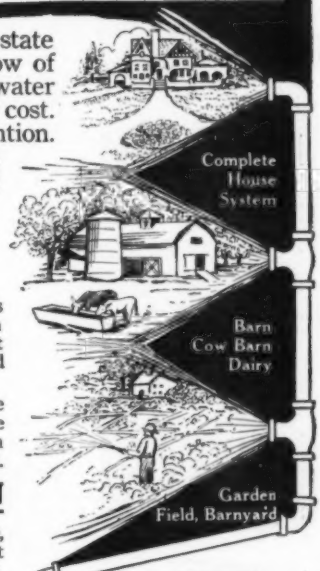

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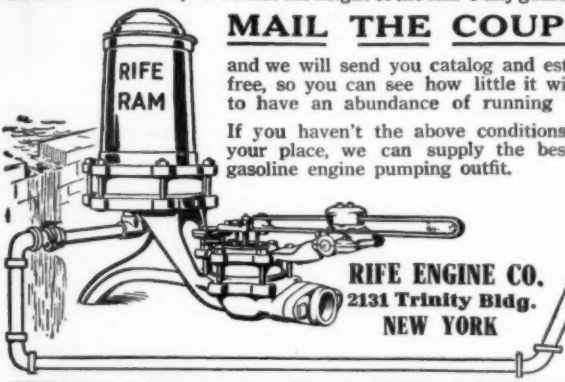

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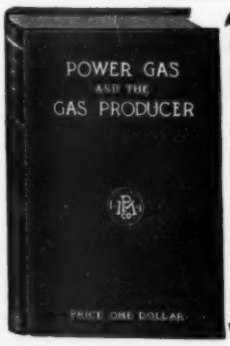

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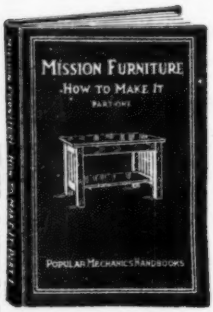

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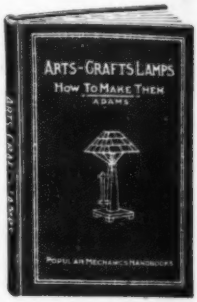

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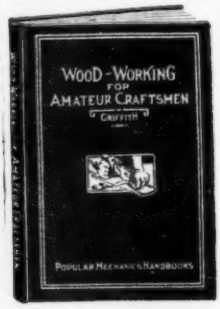

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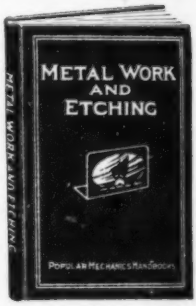

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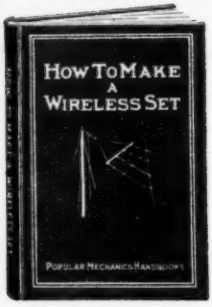

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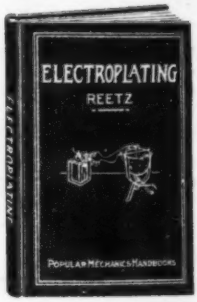

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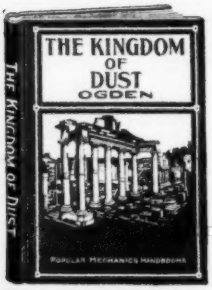

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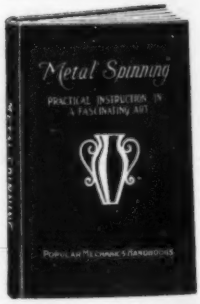

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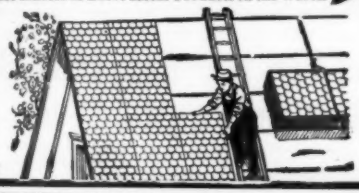

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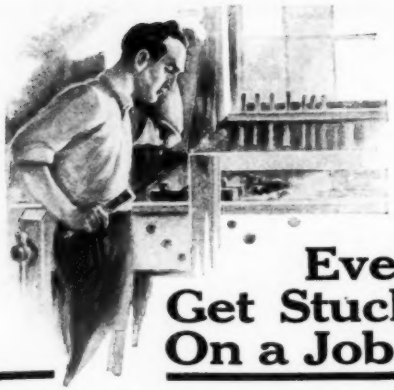

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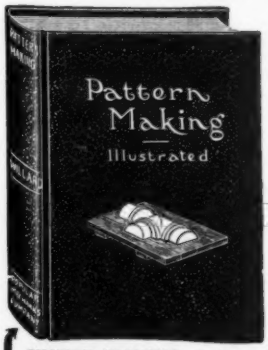

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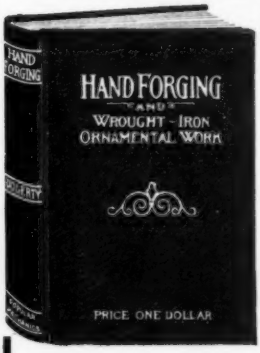

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Contributors may submit as many articles as desired, but no one will be awarded more than one prize.

Articles failing to win one of the prizes, but suitable for publication, will be promptly paid for at usual rates; all others will be returned.

On December 15th, 1913, the articles will be judged and the prize money sent at once. Publication of the names of the winners will follow in the February, 1914, issue.

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First Prize—JAMES E. COOLEY, Hartford, Conn. $10
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Second Prize—LEROY BRADLEY, Lorain, O. $5
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EXTRA AWARD

On account of there being five contributions this month each of which deserved second prize, we have made an EXTRA AWARD of four additional second prizes, as follows:

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FORREST CLARK, Coronado, Cal. $5
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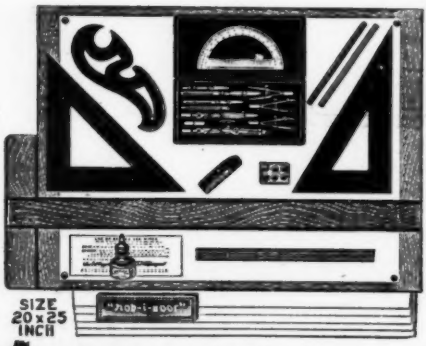

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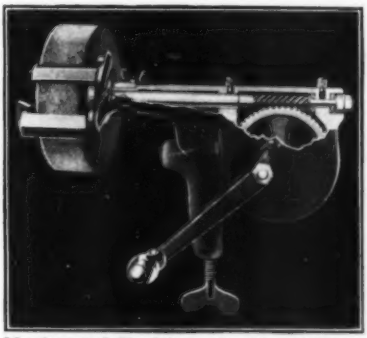
The worm gear and shaft on the Luther "BEST MAIDE" Grinder are perfect in every detail. We cut them from solid steel with special machines of our own designing. Not even the very highest priced cream separators are supplied with better or smoother gears. "BEST MAIDE" gears and shafts are of extra large diameter, which means greater wearing surface. The grinding wheel held by this extra heavy shaft must run true and without vibration.
Ball bearings are used to take up all side thrust and give as perfect and easy running a piece of mechanism as it is possible to build.



Horizontal Position—Sectional View Showing Worm Gear and Shaft

Tilting Frame

The Luther "BEST MAIDE" Grinder can be tilted so that any side of the grinding wheel can be utilized. No matter how awkward a tool may be to "get at," it is easy to sharpen it with this adjusting feature. Our new patented arrangement for swivelling the frame allows quick and accurate adjustment to ANY ANGLE—horizontal or vertical—and holds the machine rigidly in any position.

Upright

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With Chisel and Plane Bit Guide

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